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16. ABSTRACT

This is the twenty-third and final issue of OIL POLLUTION ABSTRACTS, a basic reference guide to current scientific and technical literature relevant to terrestrial and aquatic oil pollution. This issue contains 450 bibliographic entries with abstracts, covering the years 1977 to 1980. The entries are arranged in eight major topical categories comprising thirty-seven specific subcategories. The major categories are as follows: Oil pollution detection, analysis and evaluation; oil pollution prevention, response and control; environmental impacts of oil pollution; fate of oil in the environment; pollution aspects of oil exploration, development and production; pollution aspects of oil transport, transfer and storage; petroleum and petrochemical industry waste treatment and disposal; and miscellaneous publications. A permuted Subject Keyword Index provides rapid access to every citation, and an author index is included. This report is submitted to complete the fulfillment of EPA Grant R-807-366-01-0 by the Marine Science Institute, University of California, Santa Barbara.

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OIL POLLUTION ABSTRACTS

Volume 7 Number 2
(July 1980 - November 1980)

by

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Grant No. R-807366-01-0

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FOREWORD

The Environmental Protection Agency was created because of increasing public and government concern about the dangers of pollution to the health and welfare of the American people. Noxious air, foul water, and spoiled land are tragic testimony to the deterioration of our natural environment. The complexity of that environment and the interplay between its components require a concentrated and integrated attack on the problem.

Research and development is that necessary first step in problem solution and it involves defining the problem, measuring its impact, and searching for solutions. The Municipal Environmental Research Laboratory develops new and improved technology and systems for the prevention, treatment, and management of wastewater and solid and hazardous waste pollutant discharges from municipal and community sources, for the preservation and treatment of public drinking water supplies, and to minimize the adverse economic, social, health, and aesthetic effects of pollution. This publication is one of the products of that research; a most vital communications link between the researcher and the user community.

The report cites current literature, research, patents, and other materials relevant to the oil pollution abatement program and is published in an abstract format. As such, it serves as a basic reference document for all those interested in oil spill and oil pollution control. This project is part of the continuing program of the Oil and Hazardous Materials Spills Branch, MERL-Ci, to assess and mitigate the environmental impact of oil pollution.

Francis T. Mayo
Director
Municipal Environmental Research Laboratory

ABSTRACT

This is the twenty-third and final issue of OIL POLLUTION ABSTRACTS, a basic reference guide to current scientific and technical literature relevant to terrestrial and aquatic oil pollution. This issue contains 450 bibliographic entries with abstracts, covering the years 1977 to 1980. The entries are arranged in eight major topical categories comprising thiry-seven specific subcategories. The major categories are as follows: Oil pollution detection, analysis and evaluation; oil pollution prevention, response and control; environmental impacts of oil pollution; fate of oil in the environment; pollution aspects of oil exploration, development and production; pollution aspects of oil transport, transfer and storage; petroleum and petrochemical industry waste treatment and disposal; and miscellaneous publications. A permuted Subject Keyword Index provides rapid access to every citation, and an author index is included. This report is submitted to complete the fulfullment of EPA Grant N. R-807366-01 by the Marine Science Institute, University of California, Santa Barbara.

OIL POLLUTION ABSTRACTS - TOPICAL OUTLINE

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION
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   3. Sampling and Analysis
   4. Source Identification

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL
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   2. Cleanup and Removal
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   4. Personnel Training
   5. Contingency Planning and Spill Response
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   2. Physical and Chemical Aspects
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INTRODUCTION

OIL POLLUTION ABSTRACTS is a semiannual reference document (quarterly from 1974 to 1979) which summarizes current scientific and technical publications relevant to all aspects of terrestrial and aquatic oil pollution, with emphasis on the marine environment. This issue contains citations and abstracts of 450 articles, reports, books, conference papers, and other relevant literature published after 1976, and represents the last of a series of 23 issues sponsored since 1974 by the U.S. Environmental Protection Agency.

The 450 literature entries are separated into eight major topical categories which are further divided into thirty-seven specific subcategories (see Topical Outline, p. v.). Within each specific category, entries are arranged alphabetically by first author. Each cited literature entry contains the following information:

1) a citation number 80B-xxxx (sequential for the entire year);
2) a standard bibliographic citation (title, author(s), and source);
3) a set of descriptive keywords;
4) a brief summary, if available; and
5) the secondary source of the entry, wherever applicable.

Each entry is provided with several descriptive terms selected from a controlled master list of approximately 400 keywords (see Master List of Keywords) and, wherever necessary, additional free-language terms prefaced by an asterisk(*). The string of keywords for each entry is alphabetically permuted by computer to form the Subject Keyword Index, permitting rapid and specific subject access to any entry.

This issue includes a comprehensive author index, a list of scientific and technical source materials scanned for oil pollution related literature (Appendix A), an OIL POLLUTION ABSTRACTS availability listing (following page), and an ordering information sheet (Appendix B).

OIL POLLUTION ABSTRACTS*

Issues currently available, in press, or in preparation

*This series was formerly entitled:
OIL POLLUTION REPORTS (1978: Vol. 5, No. 2 to Vol. 5, No. 4)
OIL SPILL AND OIL POLLUTION REPORTS (1974 to 1978: Vol. 5, No. 1)

	DATES COVERED	REPORT NUMBER
1974	July 74 - Oct. 74	EPA-670/2-75-003
1975	Nov. 74 - Feb. 75	EPA-670/2-75-044
1975	Feb. 75 - Apr. 75	EPA-670/2-75-059
1975	May 75 - July 75	EPA-600/2-76-129
1975	Aug. 75 - Oct. 75	EPA-600/2-76-113
1976	Nov. 75 - Jan. 76	EPA-600/2-76-185
1976	Feb. 76 - Apr. 76	EPA-600/2-76-215
1976	May 76 - July 76	EPA-600/2-76-266
1976	Aug. 76 - Oct. 76	EPA-600/2-77-037
1977	Nov. 76 - Jan. 77	EPA-600/2-77-075
1977	Feb. 77 - Apr. 77	EPA-600/2-77-111
1977	May 77 - July 77	EPA-600/2-77-243
1977	Aug. 77 - Oct. 77	EPA-660/2-78-005
Vol. 5, No. 1	Nov. 77 - Jan. 78	EPA-600/2-78-071
Vol. 5, No. 2	Feb. 78 - May 78	EPA-600/7-78-160
Vol. 5, No. 3	June 78 - Sep. 78	EPA-600/7-78-218
Vol. 5, No. 4	Oct. 78 - Dec. 78	EPA-600/7-79-040
Vol. 6, No. 1	Jan. 79 - Mar. 79	EPA-600/7-79-160
Vol. 6, No. 2	Apr. 79 - June 79	EPA-600/7-79-254
Vol. 6, No. 3	July 79 - Sep. 79	EPA-600/7-80-007
Vol. 6, No. 4	Oct. 79 - Dec. 79	EPA-600/7-80-053
Vol. 7, No. 1	Jan. 80 - June 80	In press
Vol. 7, No. 2	July 80 - Nov. 80	Submitted 11/80

For complete ordering information, please see Appendix B.

ABBREVIATIONS/ACRONYMS

atm	atmosphere
bbl	barrel
C	carbon
°C	degrees Centigrade
cm	centimeter
COW	crude oil washing
DWP	deepwater port
dwt	dead weight ton
EIS	environmental impact statement
°F	degrees Fahrenheit
ft	foot
g	gram
gal	gallon
GC	gas chromatography
GLC	gas-liquid chromatography
gpd	gallons per day
gph	gallons per hour
gpm	gallons per minute
ha	hectare
hr	hour
in	inch
IR	infrared
kg	kilogram
km	kilometer
kn	knot
L	liter
lb	pound
LC	liquid chromatography
LD	lethal dose
LNG	liquefied natural gas
LOT	load on top
LPG	liquefied petroleum gas
m	meter
mg	milligram
mi	mile
min	minute
ml	milliliter
mm	millimeter
MS	mass spectrometry
N	nitrogen
N.A.	not available
nm	nautical mile
O	oxygen
OCS	outer continental shelf
OPA	OIL POLLUTION ABSTRACTS
oz	ounce
PAH	polycyclic aromatic hydrocarbon
pH	the negative log of the H ion concentration
ppb	parts per billion
ppm	parts per million
SBT	segregated ballast tank
sp.	species
TLC	thin-layer chromatography
UK	United Kingdom
US	United States
USSR	Union of Soviet Socialist Republics
UV	ultraviolet
VLCC	very large crude carrier
vs	versus
WSF	water soluble fraction
wt	weight
yr	year
µ	micron
g	microgram
%	percent
/	per
~	approximately
>	greater than
<	less than

ABBREVIATIONS/ACRONYMS (continued)

API	American Petroleum Institute
ASTM	American Society for Testing and Materials
BLM	Bureau of Land Management
CEQ	Council on Environmental Quality
DOE	Department of Energy
EPA	Environmental Protection Agency
ERDA	Energy Research and Development Administration
FAO	Food and Agricultural Organization
FEA	Federal Energy Administration
IMCO	International Maritime Consultative Organization
NASA	National Aeronautics and Space Administration
NBS	National Bureau of Standards
NOAA	National Oceanic and Atmospheric Administration
NTIS	National Technical Information Service
OHMSETT	Oil and Hazardous Materials Simulated Environmental Test Tank
SSIE	Smithsonian Science Information Exchange
UN	United Nations
UNEP	United Nations Environment Program
UNESCO	United Nations Educational, Scientific and Cultural Organization
US	United States
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDI	United States Department of the Interior
USFWS	US Fish and Wildlife Service
USGS	United States Geological Survey
USN	United States Navy

REPORTS, PUBLICATIONS, AND PATENTS

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

80B-0751
OIL SPILL PREVENTION AND RECOVERY [NEWS BRIEF]
Anon. 1977.
Pollution Monitoring, No. 37:39.

Spill cleanup, Spill removal, Monitoring, Ballast, Equipment, Product information

"Three systems are briefly described for... the continuous monitoring of oil in bilge and ballast water, the Oili oil content meter is described and a compact container developed for carrying all necessary oil pollution control equipment."

[from Aquatic Sciences and Fisheries Abstracts 8(2):196. 1978]

80B-0752
SONAR OIL THICKNESS SENSOR MAY FIND COMMERCIAL APPLICATIONS [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(7):47.

Detection, Oil slicks, Spill response, Equipment, Product information, Monitoring, *Oil thickness sensor

Under NOAA sponsorship, the University of Rhode Island has developed a Sonar Oil Thickness Sensor (SOTS) which can measure and calculate oil slick thickness. The device may be useful in oil spill research and equipment development, pollution control response efforts, and for measurement of oil/water interfaces in tankers.

80B-0753
MONITORING OF DISSOLVED AND DISPERSED PETROLEUM HYDROCARBONS IN RIJEKA BAY
Ahel, M. and M. Picer. 1978.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.99-101.

Monitoring, Hydrocarbons, WSF, Chemical analysis, Sampling, Bays, Coasts, Distribution, Contamination, *Adriatic Sea

"Monitoring of the dissolved and dispersed petroleum hydrocarbons in Rijeka Bay was conducted over a three year period. In order to reach a real insight into the Rijeka Bay water body pollution, various methods and techniques were employed: IR spectrophotometry, fluorometry, gas chromatography, and mass spectrometry. Interpretation of the results was made not with the sole purpose of explaining the petroleum distribution but also with intent to better understand the movements of the water masses and in an attempt to trace the dilution effect after the original petroleum contamination."

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

80B-0754
MONITORING OF POLYNUCLEAR AROMATIC HYDROCARBONS IN WATER. 2. EXTRACTION AND RECOVERY OF SIX REPRESENTATIVE COMPOUNDS WITH POLYURETHANE FOAMS.
Basu, D.K. and J. Saxena. 1978.
Environmental Science and Technology 12(7):791-795.

Monitoring, PAH, Absorption, Analytical techniques

"Flexible polyurethane foam plugs effectively concentrated trace quantities of the six representatives of the polynuclear family from large volumes of finished and raw waters when the water was heated to 62±2°C and passed through foam plugs at a flow rate of 250±10 mL/min." Retention efficiencies, method of purification of the concentrate, and PAH recovery rate are examined. Thin-layer chromatography coupled with fluorometric detection was chosen for sensitivity and selectivity.

[from Aquatic Sciences and Fisheries Abstracts 9(2):210. 1979]

80B-0755
SPILL SURVEILLANCE
Biglane, K.E. 1977.
Oil Spills and Spills of Hazardous Substances. Washington, DC, US Environmental Protection Agency, 1977. p.9-10.

Detection, Surveillance, Oil spills, Monitoring

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1018826. 1980]

80B-0756
OIL SPILL DETECTION AND IDENTIFICATION USING A LASER FLUOROSENSOR
Buja-Bijunas, L., et al. 1979.
NATO-CCMS Pilot Study on the Use of Remote Sensing for the Control of Marine Pollution, Workshop, Washington, DC, 18-20 April 1979. 20p?

Detection Equipment, Oil spills, *Laser fluorosensor

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1020486. 1980]

80B-0757
OIL SPILL MARKER [NEWS BRIEF]
Gregalan Marketing Ltd. 1977.
Offshore Services 10(8):63.

Monitoring, Drift, Movement, Oil slicks, Remote sensing, Equipment, Product information

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

"An oil spill marker buoy, developed in Canada and available in the UK from Gregalan Marketing Ltd, London is said to have a drift characteristic similar to that of an average oil slick. It drifts with the oil, transmitting a signal which ensure that the location of the slick is known."

[from Aquatic Sciences and Fisheries Abstracts 8(12):140. 1978]

80B-0758
OIL AND TAR SEEP STUDIES ON THE SHELVES OFF SOUTHERN CALIFORNIA, SANTA MONICA BAY
Henyey, T.L., T.R. Nardin, B.A. Nardin. 1977.
California Offshore Gas, Oil, and Tar seeps
Sacramento, California State Lands Commission, 1977. p.63-109.

Natural seepage, Tar, Coastal waters, California, Distribution, Sources, *Santa Monica Bay, *Geophysics

This report examines the marine geological and geophysical work done by the University of Southern California in the Santa Monica Bay region. It presents the results of high resolution, air gun and magentic profiling data in the Santa Monica Bay region.

80B-0759
OIL AND TAR SEEP STUDIES ON THE SHELVES OFF SOUTHERN CALIFORNIA, SEISMICITY OF THE SOUTHERN CALIFORNIA COASTAL ZONE
Henyey, T.L. and T. Teng. 1977.
California Offshore Gas, Oil, and Tar seeps
Sacramento, California State Lands Commission, 1977. p.110-135.

Natural seepage, Tar, Coastal waters, California, OCS, Statistics, *Seismicity

"This report reviews the seismicity data for the coastal zone of southern California. The area under consideration extends from Point Arguello in the north to the Mexican border." Emphasis is on earthquake statistics between 1932-1974. The use of this information is used to outline potentially hazardous areas and to suggest recurrence intervals within the coastal zone.

80B-0760
INSTRUMENTATION TO MEASURE THE OIL THICKNESS ON A WAVY WATER SURFACE
Kordyban, E. and S. Cuker. 1978.
Review of Scientific Instruments 49(11):1574-1578.

Equipment, Detection, Oil slicks, Sea surface, Performance testing, Product information

The title instrumentation consists of a probe which follows the water surface; an attached light-sensitive gauge measures its own depth of submergence in opaque oil. Performance tests on components and preliminary in situ testing results are presented.

[from Aquatic Sciences and Fisheries Abstracts 9(3):149. 1979]

80B-0761
OIL POLLUTION DETECTION AND SENSING. VOLUME 2. 1976-NOVEMBER 1979
(A BIBLIOGRAPHY WITH ABSTRACTS)
Lehmann, E.J. 1979.
Report NTIS-PB80-801384. p.

Detection, Remote sensing, Monitoring, Surveillance, Bibliographies

Summary not available.

[from Spill Technology Newsletter 5(1):4. 1980]

80B-0762
DETERMINATION OF OIL CONTENT OF OIL CONTAMINATED SOIL
McGill, W.B. and M.J. Rowell. 1979.
Science of the Total Environment 14(3):245-253.

Contamination, Soil, Detection, Crude oil, Concentrations

"The effectiveness of methylene chloride as an extractant to measure the oil content of oil contaminated soils was examined. Soil preparation and pretreatment requirements were also studied. The results indicate that methylene chloride extracts topped crude oil efficiently from both mineral and organic soils.... A method of extracting and measuring the quantity of extracted oil is presented."

80B-0763
SCIENTIFIC BASIS FOR OIL POLLUTION BIOLOGICAL MONITORING IN THE MEDITERRANEAN SEA
Mironov, O.G. 1978.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.91-92.

Monitoring, Biodegradation, Sampling, Microorganisms, Mollusks, Concentrations, Black Sea, Mediterranean Sea, USSR

Soviet field research as part of an international program entitled Microorganisms Oxidizing Hydrocarbons in the Sea (1975) is summarized. The field studies indicate that, in the Black Sea, "only about 2000 tons of petroleum products might be oxidized in a year" by microbial degradation. Also, mussels in polluted regions contain seven times as much normal paraffins as those in relatively unpolluted regions of the Black Sea.

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

80B-0764
MONITORING OF OIL POLLUTION BY FLUORESCENCE [NEWS BRIEF]
NEI International Combustion, Ltd. 1978.
Pollution Monitor No.45:13-14.

Monitoring, Contamination, Equipment, Concentrations

"A fluorescence method for detecting oil contaminants in industrial effluents is described as well as detection equipment." The two instruments examined from NEI International Combustion Ltd. are the Oil Pollution Monitor, which detects oil at the 0-10 ppm level, and the Oil Pollution Detector which is used for detecting higher concentrations of oils.

[from Pollution Abstracts 10(5):882. 1979]

80B-0765
PETROLEUM HYDROCARBONS IN MARINE SEDIMENTS AND ANIMALS FROM THE ISLAND OF MALTA
Nickless, G. 1978.
Environmental Pollution 16(1):17-30.

Sampling, Sediments, Benthos, Fish, Mollusks, Invertebrates, PAH, Coastal waters, *Malta

"Marine sediments (taken from the top 10 cm) and animals (sea squirts, grey mullet, mussels, and oysters) were collected from the coastal waters of Malta in August 1975. Aliphatics and PAHs were identified by their retention times and by coinjection with standards."

[from Pollution Abstracts 10(1):45. 1979]

80B-0766
OIL POLLUTION IN THE PERSIAN GULF AND APPROACHES, 1978
Oostdam, B.L. 1980.
Marine Pollution Bulletin 11(5):138-144.

Detection, Sampling, Oil slicks, Persian Gulf

An analysis was made of a total of 673 positive and negative reports on oil slick sightings during 1978 compiled by the Japanese Oceanographic Data Center. The estimated total amount of oil contained in slicks in the Persian Gulf and its approaches is estimated to range from 150,000 to 200,000 m^3.

A. OIL POLLUTION DETECTION, ANAYLSIS AND EVALUATION

1. Detection and Monitoring

80B-0767
SOLID STATE LASER/FIBER OPTIC SYSTEM FOR MEASURING OIL IN WATER
Pitt, G.D. 1978.
Electrical Communication 53(2):175.

Wastewater, Ships, Tankers, Equipment, Monitoring, Performance testing, UK

An IMCO-approved oil pollution control system has received its first certification from the UK Department of Trade. The monitor measures oil in tanker ballast and ships' bilge discharge. Seven features are mentioned, namely accuracy, scope of measurement on a single calibration, safety, response to solids, design conformity, self-testing ability and freedom from clogging.

[from Aquatic Sciences and Fisheries Abstracts 9(2):212. 1979]

80B-0768
THIN FILM DETECTION LIMITS OF LASER FLUOROSENSORS
Rayner, D.M. 1979.
Ottawa, Ontario, National Research Council of Canada, Division of Biological Sciences, 1979. 27p.

Oil slicks, Physical aspects, Detection, *Laser fluorosensors

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1019531. 1980]

80B-0769
NATIONAL PROGRAMME IN THE FIELD OF MARINE POLLUTION MONITORING AND RESEARCH (MALTA)
Saliba, L.J. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.51-53.

Monitoring, Marine organisms, Contamination, Beaches, Coastal waters, Sublethal effects, Toxicity, UNEP, Mediterranean Sea, *Malta

Reviewed are current marine pollution monitoring and research programs by the Government of Malta in coordination with UNEP and other organizations. Programs include monitoring of oil in coastal waters, beaches, and marine organisms, and research on hydrocarbon and oil toxic and sublethal effects, effects of oil on enzyme systems, and pollutant transport in coastal waters.

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

80B-0770
VOLATILE LIQUID HYDROCARBONS IN WATERS OF THE GULF OF MEXICO AND CARIBBEAN SEA
Sauer, T.C. Jr. 1980.
Limnology and Oceanography 25(2):338-351.

Concentrations, WSF, Hydrocarbons, Seawater, Gulf of Mexico, Caribbean Sea, Marine organisms

The concentrations of volatile liquid hydrocarbons (VLH), C_6-C_{14} hydrocarbons, in coastal, shelf, and open-ocean surface waters of the Gulf of Mexico and Caribbean Sea were studied. The research involving VLH has been concerned with laboratory studies of the exposure of marine organisms to the water - soluble fraction of petroleum.

80B-0771
OIL SPILL DETECTION SIMPLIFIED
Spohr, G.W. 1979.
Public Works 110(1):62.

Detection, Equipment, Oil spills, *Sewers

The title article consists of a brief description of a qualitative technique using readily available materials for detection of oil spills in sewers.

[from UDS Water Quality Control Digest 10(2):II-19, #9A-135. 1979]

80B-0772
LOCATION AND AREA MEASUREMENT OF ROCK AND GROUNDWATER OIL CONTAMINATION BY SURFACE METHODS
Svoma, J. (ed.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01, NTIS Report CONF-78 06143. p.309-317.

Detection, Analytical techniques, Contamination, Groundwater

"Non-destructive methods of detecting oil spills are reviewed."

[from UDS Water Quality Control Digest 11(2):II-21, #9L-202. 1980]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

1. Detection and Monitoring

80B-0773

POLLUTION BY PETROLEUM HYDROCARBONS ALONG ALEXANDRIA COAST
Wahby, S.D. 1978.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.93-98.

Monitoring, Hydrocarbons, Tar balls, Mediterranean Sea, Distribution, Concentrations

Presently, monitoring of petroleum hydrocarbons along the Alexandria coast consists of studying the rate of tar accumulation on beaches. The amount of tar on the beaches ranged between a maximum of 380gm/m^2/15 days and a minimum of 3.5gm/m^2/15 days. The accumulation of tar was correlated with wind strength and duration. The maximum amount of tar accumulation occurred in the winter, the minimum in autumn.

80B-0774

DETERMINATION OF PETROLEUM PRODUCTS IN WATER
Zelinkova, D. and Z. Weidenhoffer. (eds.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01, NTIS Report CONF-7806143. p.303-306.

Petroleum products, Analytical techniques, Spectrometry, Chromatography, Detection

"Use of the following methods for the sensitive and precise determination of oil products in water is discussed: Automatic carbon content analyzer, IR spectrophotometry, gas chromatography, mass spectrometry, and solvent extraction."

[from UDS Water Quality Control Digest 11(1): IV-05, #9L-201. 1980]

2. Remote Sensing

80B-0775

DETECTION OF HYDROCARBON LAYERS IN THE SEA [NEWS BRIEF]
Anon. 1978.
L'Eau Pure: Protection de la Nature No.50:24.

Remote sensing, Hydrocarbons, Oil slicks, Oil discharges, Ships, Tankers, Natural seepage

Of the 5-10 million tons of hydrocarbons discharged into the sea each year, 50% is discharged directly from land, 30% by tankers, 15% from other boats and structures, and 5% from sea floor seepage. "The following methods of surveillance are described: aerial photography; visible radiometry; IR radiometry; lateral antenna radar; low light television cameras; and multi-frequency passive radiometry."

[from Pollution Abstracts 11(1)34-35. 1980]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

2. Remote Sensing

80B-0776
OIL SPILLAGE LASER SURVEILLANCE SYSTEM
Anon. 1977.
Holland Shipbuilding 26(5):50.

Remote sensing, Surveillance, North Sea, Norway, Coasts, Design-engineering, Equipment, Product information

A permanent laser surveillance system for the North Sea and Norwegian coastline, functioning as a warning device for oil spillage was developed by the Continental Shelf Institute and the Physics Institute at the University of Bergen. Capabilities of the system are discussed.

[from Aquatic Sciences and Fisheries Abstracts 8(2):173. 1978]

80B-0777
DETECTING WATER POLLUTION FROM COLOR AND INFRARED COLOR PHOTOGRAPHY
Ahmad, S.A. 1977.
American Society of Photogrammetry Meeting, Little Rock, Arkansas, 18-21 October 1977. Falls Church, Virginia, American Society of Photogrammetry, 1977. 17p.

Remote sensing, Detection, Contamination, *Color photography

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1019938. 1980]

80B-0778
INVESTIGATION OF WATER POLLUTION ALONG THE MEDITERREAN COAST OF TURKEY BY THE USE OF REMOTE SENSING TECHNIQUES
Atuk, N. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.641-643.

Remote sensing, Monitoring, Surveillance, Pollution control, Coasts, Coastal waters, Tankers, Mediterranean Sea, *Turkey

Current Turkish programs to prevent, control, and monitor marine oil pollution, are briefly outlined. Because of Turkey's nearly 6000 km long coastline, pollution monitoring and detection, and surveillance of illegal ballast and bilge discharge from tankers will involve extensive use of landsat imagery and other remote sensing techniques.

80B-0779
AIRBORNE MONITORING OF SURFACE WATER POLLUTANTS BY FLUORESCENCE SPECTROSCOPY
Bristow, M.P.F. 1978.
Remote Sensing of Environment 7(2):105-127.

Remote sensing, Sea surface, Oil slicks, *Laser fluorosensor

An airborne laser fluorosensor has been used to record fluorescence profiles of a controlled oil spill, to demonstrate the manner in which the target changes both in space and time, and to provide data for use in the design of an advanced laser fluorosensor capable of recording fluorescence and decay time data.

80B-0780
LASER FINDS SPILLS IN FIRST TESTS
Cumming, D. 1979.
Northern Development 11(3):12.

Remote sensing, Oil spills, Cold climates, Detection, Equipment, *Lasers

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1020441. 1980]

80B-0781
APPLICATION OF REMOTE SENSING FOR OIL SPILL PREVENTION, CONTROL AND COUNTERMEASURES COMPLIANCE MONITORING
Duggan, J.S. 1977.
American Society of Photogrammetry Meeting, Little Rock, Arkansas, 18-21 October 1977. Falls Church, Virginia, American Society of Photogrammetry, 1977. 10p.

Remote sensing, Pollution prevention, Source identification, Monitoring, Surveillance, Pollution control

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1019263. 1980]

80B-0782
AIRBORNE REMOTE SENSING APPLICATIONS FOR THE DETECTION AND MONITORING OF OIL FROM NATURAL SEEPS AND OTHER SOURCES
Estes, J.E. and S.P. Kraus. 1977
California Offshore Gas, Oil, and Tar seeps. Sacramento, California State Lands Commission, 1977. p.256-322.

Remote sensing, Detection, Monitoring, Natural seepage, Tar, Sources, Santa Barbara Channel, California, *Geology, *Oceanography

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

2. Remote Sensing

"This report provides an in-depth review of the use of remote sensing for the detection and monitoring of petroleum in the marine environment. The primary purpose of the survey program was to obtain information concerning geologic, oceanographic, and chemical conditions affecting active and potentially active seeps in the Santa Barbara Channel and to assess the capability of airborne sensor systems to monitor seep oil on the ocean surface."

80B-0783
LANDSAT TRACKS MEXICAN GULF OIL SPILL
Gregory, W.H. 1979.
Aviation Week and Space Technology 3(15):42-43.

Remote sensing, Ixtoc I spill, Gulf of Mexico, Surveillance, Monitoring, *Landsat

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1020371. 1980]

80B-0784
REMOTE POLLUTION PROBING BY LASER-INDUCED LUMINESCENCE TECHNIQUES
Grojean, R.E., et al. 1978.
Optical Engineering 17(2):139-142.

Remote sensing, Detection, Oil spills, *Laser-induced luminescence

Consideration is given to the problem of remote detection for laser-stimulated luminescent systems. Results indicate that laser-induced fluorescence is a practical technique for the remote detection of oil spills.

80B-0785
EVALUATION OF OCEAN COLOR SCANNER (OCS) PHOTOGRAPHIC AND DIGITAL DATA: SANTA BARBARA CHANNEL TEST SITE, 29 OCTOBER 1975 OVERFLIGHT
Kraus, S.P., J.E. Estes, M.R. Kronenberg and E.J. Hajic. 1977.
Report NASA-CR-15511, Grant NSG-5106. 54p.

Remote sensing, Detection, Oil slicks, Natural seepage, Santa Barbara Channel, *Ocean color scanner

Ocean color scanner (OCS) data was examined to evaluate detection and discrimination capabilities of the system for marine resources, oil pollution and man-made sea surface targets of opportunity in the Santa Barbara Channel. Determination of sediment transport patterns along the coastal zone was a secondary goal.

[from DIALOG Database, File 6, NTIS 64-80/ISS 11: #E0352D2. 1980]

80B-0786

OIL SEEP SURVEY OVER COAL OIL POINT AND SANTA BARBARA CHANNEL, CALIFORNIA, OCTOBER 1976
Kraus, S.P. and J.E. Estes. 1977.
California Offshore Gas, Oil, and Tar seeps. Sacramento, California State Lands Commission, 1977. p.323.346.

Remote sensing, Natural seepage, Santa Barbara Channel, California, Fate, Behavior, Distribution, Oil slicks, Movement, *Meteorology, *Oceanography

This report describes the results of an airborne natural seep monitoring program, the objectives of which were to: 1) obtain baseline data on the extent, fate, and behavior of seep oil; 2) map general surface configuration of observed seep-related slicks; 3) estimate the total volume of oil on the surface during each flight; and 4) attempt to determine the relative impact of meteorological and oceanographic influences on oil seep activity and surface slick configurations.

80B-0787

USE OF REMOTE SENSING AND GROUND CONTROL IN MONITORING OIL FIELDS IN ALABAMA.
La Moreaux, P.E. (ed.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01, NTIS Report CONF-7806143. p.331-349.

Remote sensing, Monitoring, Oil fields, Alabama, Water quality

Present and future water pollution problems resulting from oil field operations in Alabama are analyzed, and approaches to monitoring are discussed.

[from UDS Water Quality Control Digest 11(1):IV-05, #9L-204. 1978]

80B-0788

AN ANALYSIS OF MULTISPECTRAL LINE SCANNER IMAGERY FROM TWO TEST OIL SPILLS
Neville, R.A. et al. 1979.
NATO-CCMS Pilot Study on the Use of Remote Sensing for the Control of Marine Pollution, Workshop, Washington, DC, 18-20 April 1979. 29p.

Remote sensing, Oil spills, Performance testing, Equipment

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1020487. 1980]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUTION
2. Remote Sensing

80B-0789
AIRBORNE REMOTE SENSING OF OIL SPILLS IN COASTAL WATERS-RECOMMENDATIONS OF PANEL II-TECHNIAL RESULTS AND THE NEED FOR FUTURE RESEARCH
O'Neil, R.A. et al. 1979.
NATO-CCMS Pilot Study on the Use of Remote Sensing for the Control of Marine Pollution, Workshop, Washington, DC, 18-20 April 1979. 10p.

Remote sensing, Coastal waters, Oil spills, Performance testing

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1019263. 1980]

80B-0790
THE APPLICATION OF REMOTE SENSING DATA FOR DETECTION OF OIL POLLUTION IN THE MARINE ENVIRONMENT
Ozmumcu, O. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.639-640.

Remote sensing, Detection, Marine environment, Contamination

"The detection of oil on seawater is possible with a variety of sensors operating in several wave-length regions of the electromagnetic spectrum. Those sensors operating in the ultraviolet, thermal infrared and microwave regions exhibit quite good oil detection capabilities. At present, no remote sensing system is capable of providing accurate information on the type or thickness of an oil slick."

80B-0791
DETECTION AND MONITORING OF OIL POLLUTION IN THE ICE ENVIRONMENT THROUGH MICROWAVE TECHNIQUES
Parashar, S.K., B. Dawe, and R.D. Worsfold. 1978.
Canada Symposium on Remote Sensing, 5th, Victoria, BC, 28-31 August 1978. p.348-355.

Remote sensing, Monitoring, Detection, Contamination, Ice, *Microwave

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1018773. 1980]

80B-0792
A LABORATORY STUDY OF THE POTENTIAL OF TIME-RESOLVED LASER FLUOROSENSORS: SUPPLEMENT
Rayner, D.M. and A.G. Szabo. 1978.
Ottawa, Canada, National Research Council of Canada, Division of Biological Sciences, 1978. 44p.

Remote sensing, Analytical techniques, Performance testing, Oil slicks, *Laser fluorosensors

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1015586. 1980]

80B-0793
DEVELOPMENT OF AN ACTIVE SPILL DETECTION SYSTEM (ASDS) FOR REMOTE DETECTION OF OIL SPILLS
Rouse, T.W. et al. 1977.
Washington, DC, US Coast Guard, Office of Research and Development, 1977. 54p.

Remote sensing, Detection, Oil spills, USCG, Performance testing, Equipment, Design-engineering

Summary not available.

[from RESORS, Canada Centre for Remote Sensing: #1019654. 1980]

80B-0794
HIGH CONTRAST IMAGING OF AN OIL SLICK BY MEANS OF A LOW LIGHT LEVEL TELEVISION
Thomson, V., R.A. Neville, and R.A. O'Neil. 1979.
NATO-CCMS Pilot Study on the Use of Remote Sensing for the Control of Marine Pollution, Workshop, Washington, DC, 18-20 April 1979. 15p.

Remote sensing, Oil slicks, Detection, Equipment

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1020488. 1980]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

2. Remote Sensing

80B-0795
TELEDETECTION OF THE THICKNESS OF OIL FILMS ON POLLUTED WATER BASED ON THE OIL FLUORESCENCE PROPERTIES
Visser, H. 1979
Applied Optics 18(11):1746-1749.

Remote sensing, Oil slicks, Detection, Physical aspects, *Thickness, *Fluorescence

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1019562. 1980]

80B-0796
INVESTIGATION OF THE USE OF MICROWAVE SYSTEMS IN DETECTING AND MONITORING OIL SLICKS OVER ICE-INFESTED WATERS. PHASE I REPORT.
Worsfold, R.D. 1978.
St. John's, Newfoundland, Memorial University, Center for Cold Ocean Resources Engineering, C-CORE Report No. 78-18. 412p.

Remote sensing, Oil slicks, Monitoring, Detection, Ice, Equipment

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1018215. 1980]

3. Sampling and Analysis

80B-0797
SUBSURFACE OIL-RICH LAYER DISCOVERED IN OPEN OCEAN [NEWS BRIEF]
Anon. 1979.
Sea Technology 20(11):57.

Sampling, Chemical analysis, Distribution, Natural seepage, Seawater, Weathering, Crude oil, NOAA, Caribbean Sea, Atlantic Ocean

In a NOAA-sponsored cruise of the R/V Researcher, an unusual water layer containing 3-12 mg/L oil was discovered at a depth of 200 m in the eastern Caribbean and southwest North Atlantic Ocean. The oil rich layer was estimated to be 800 miles long, one mile wide, and 100m thick, totalling over one megaton oil. Chemical and C^{14} anaysis showed the oil to be a weathered crude, probably from a submarine seep. "The quantity of oil described here may have been greater than the total estimated oil entering the sea annually."

80B-0798
THE ANALYSIS AND CONTROL OF VOLATILE HYDROCARBON CONCENTRATIONS DURING OIL BIOASSAYS
Atkinson, L.P., W.M. Dunstan and J.G. Natoli. 1977.
Water, Air and Soil Pollution, Vol. 8:235-242.

Chemical analysis, Concentrations, Hydrocarbons, Bioassay

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:15, #3591. 1979]

80B-0799
HYDROCARBON STUDIES IN PUGET SOUND AND OFF THE WASHINGTON COAST. REPORT OF PROGRESS, MARCH 1976 THROUGH FEBRUARY 1977.
Carpenter, R. and A.W. Fairhall. 1977.
Seattle, Washington, University of Washington, Department of Oceanography, 1977. 37p.

Sampling, Distribution, Concentrations, Hydrocarbons, Pacific Coast, Washington, Puget Sound

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:88, #4280. 1979]

80B-0800
TRACE ANALYSIS OF OIL IN SEA WATER BY FLUORESCENCE SPECTROSCOPY
Cretney, W.J., W.K. Johnson and C.S. Wong. 1977.
Victoria, BC, Canada, Institute of Ocean Sciences, Patricia Bay, 1977, Pacific Marine Science Report 77-5. 38p.

Sampling, Chemical analysis, Seawater, Crude oil, Spectroscopy, Concentrations, Pacific Ocean, Canada

After selecting chrysene as the most suitable standard for determining trace amounts of crude and residual fuel oils in seawater, samples of seawater from offshore British Columbia were collected and analyzed, aboard ship and again in a shore based laboratory. "The average concentration of fluorescent extractable compounds in sea water collected at Ocean Station P (50°N, 145°W) was 0.038 µg/L when expressed as an equivalent concentration of chrysene...[or] expressed as an equivalent concentration of a typical crude oil...about 0.4µg/L."

80B-0801
POLYCYCLIC AROMATIC HYDROCARBON CARCINOGENS IN COMMERCIAL SEAFOODS
Dunn, B.P. and J. Fee. 1979.
Journal of the Fisheries Research Board of Canada 36(12):1469-1476.

PAH, Sampling, Fish, Distribution, Concentrations, Carcinogens, *Creosote

Title study analyzed information using a thin layer chromatographic separation technique and quantitation by fluorescence. Commercial samples of vertebrate fish did not contain detectable levels, except where fish were packed in vegetable oil. Resulting levels were substantially higher than previously reported for any foodstuff, and were probably attributable to creosote contamination during impoundment. [possibly oil pollution related]

[from Marine Pollution Research Titles 7(2):291. 1980]

80B-0802
HAZARDOUS CHEMICAL AND OIL SPILL ANALYSIS BY DC PLASMA EMISSION SPECTROSCOPY
Eastwood, D. et al. 1979.
Report EML-356, NTIS Report PC-A23/MF A01. p.I.463-I.478.

Chemical analysis, Spectroscopy, Analytical techniques, Freshwater, Seawater, Source identification

"DC Plasma emission spectroscopy was used to analyze environmental samples of salt-, brackish- and fresh water for both high (ppm) and low (ppb) levels of 19 elements. The purpose of this research was the development of analytical methods for identification and quantitation of inorganic hazardous chemicals involved in transportation-related spills."

[from UDS Water Quality Control Digest 11(1):IV-02, #9K-271. 1980]

80B-0803
NEW DATA ON THE DISTRIBUTION OF POLLUTANTS AND THEIR EFFECT ON SOME HYPONEUSTON COMMUNITIES IN THE S.E. MEDITERRANEAN
El-Hehyawi, M.L. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.301-305.

Distribution, Sampling, Tar balls, Beaches, Zooplankton, Coastal waters, Drilling, Mediterrean Sea, *Neuston

The distribution of tar balls on beaches was found to be most dense in the western regions, decreasing towards the east. This appears to be due to the influence of seasonal northwesterly wind. "In addition, the very poor zooplankton abundance in the oil drilling area in Abu-Qir Bay may reveal that measures for protection against effective hydrocarbons are inadequate."

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION
3. Sampling and Analysis

80A-0804
HYDROCARBON POLLUTION OF SURFACE WATERS OF THE WESTERN MEDITERRANEAN. PART TWO: DISSOLVED HYDROCARBONS [ENGLISH SUMMARY]
Faraco, F. and J. Ros. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.117-122.

Hydrocarbons, WSF, Sea surface, Contamination, Concentrations, Sampling, Mediterranean Sea

Water samples from the sea surface at 1 m depth of the western Mediterranean Sea were collected by the R.V. Cornide de Saavedra and the results of hydrocarbon concentration detected by fluorescence spectroscopy are presented. Concentrations of dissolved hydrocarbons ranged from 1 to 123.5 ppb after analyzing a total of 121 samples.

80B-0805
HYDROCARBONS IN CORES OF NORTHWESTERN ATLANTIC COASTAL AND CONTINENTAL MARGIN SEDIMENTS
Farrington, J.W., N.M. Frew, P.M. Gschwend and B.W. Tripp. 1977.
Estuarine and Coastal Marine Science 5(6):793-808.

Distribution, Concentrations, Hydrocarbons, Sources, Sediments, OCS, Atlantic Coast, Massachusetts

Concentrations and composition of hydrocarbons in sections from Buzzards Bay, Massachusetts are presented, as well as various sources of hydrocarbons in surface sediments and the processes which could govern their distribution.

80B-0806
THE DISTRIBUTION, COMPOSITION AND TRANSPORT OF SUSPENDED PARTICULATE MATTER IN THE NORTHWESTERN GULF OF ALASKA, SOUTHEASTERN BERING SHELF AND LOWER COOK INLET
Feely, R.A. and J.D. Cline. 1977.
USNOAA Outer Continental Shelf Environmental Assessment Program. Vol. XIII. Contaminant Baselines. p.89-179.

Distribution, Fate, Movement, Baseline studies, Gulf of Alaska, Bering Sea, *Suspended particulates

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:89, #4294. 1979]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION

3. Sampling and Analysis

80B-0807
OIL SPILLS IN THE MARINE ENVIRONMENT AT MADRAS AND ITS IMPACT ON NEUSTON AND PLANKTON DURING 1975-1976
Fernandez, G.A., A. Daniel and P. Nicket. 1977.
Symposium on Warm Water Zooplankton, Goa, India, 14 October 1976.
Goa, India, National Institute of Oceanography, 1977. p.432-439.

Chemical analysis, Contamination, Distribution, Coastal water, Harbors, Marine organisms, Biological effects, India, *Madras

Data obtained from gas chromatograms of the title oil polluted zones and the abundance of neuston-plankton have been computerized for a new Oceanic and Environmental Data Center. Spill analysis indicated the frequent occurrence of a variety of oils in the title harbor area; spill maps have been compared to neuston-plankton distribution, revealing both a lower biomass and a predominance of hardy species in the polluted zones.

[from Aquatic Sciences and Fisheries Abstracts 9(3):160. 1979]

80B-0808
DISSOLVED PETROLEUM HYDROCARBONS IN SOME REGIONS OF THE NORTHERN INDIAN OCEAN
Gupta, R.S., S. Z. Qasim, S.P. Fondekar and R.S. Topgi. 1980.
Marine Pollution Bulletin 11(3):65-68.

Hydrocarbons, Sampling, Detection, Concentrations, Tankers, Coasts, Indian Ocean

Dissolved petroleum hydrocarbons were measured in parts of the Northern Indian Ocean using UV absorbance techniques. Oil concentrations ranged from 0.6 to 26.5 µg/L with the higher concentrations recorded from the oil tanker routes as compared with the coastal areas of the Arabian Sea and the Bay of Bengal.

80B-0809
HIGH PRESSURE LIQUID CHROMATOGRAPHIC DETERMINATION OF POLYNUCLEAR AROMATIC HYDROCARBONS IN OYSTERS
Hanus, J.P, H. Guerrero, E.R. Biehl and C.T. Kenner. 1979.
Journal of the Association of Official Analytical Chemists 62(1):29-35.

Chemical analysis, Chromatography, PAH, Mollusks, *Oysters

"A high pressure liquid chromatography procedure is described for determining 13 polynuclear aromatic hydrocarbon compounds in oysters at the 2 ppb level." [possibly oil pollution related]

A. OIL POLLUTION DETECTION, ANALYSIS AND EVALUATION
3. Sampling and Analysis

80B-0810
OIL AND TAR SEEP STUDIES ON THE SHELVES OFF SOUTHERN CALIFORNIA, CHEMICAL WEATHERING OF OIL AND TAR FROM NATURAL SEEPS
Henyey, T.L. and T.J. O'Neil. 1977.
California Offshore Gas, Oil, and Tar seeps. Sacramento, California State Lands Commission, 1977. p.136-151.

Chemical analysis, Natural seepage, Tar, Crude oil, Coastal waters, Beaches, Analytical techniques, California

This report summarizes the work to date pertaining to the chemical characterization of oil and tar in the marine coastal environment from Point Conception to the Redondo Beach area. The sampling procedures, analytical analyses, and results to date are also examined.

80B-0811
HAS THE AMOUNT OF TAR ON THE OPEN OCEAN CHANGED IN THE PAST DECADE?
Knap, A.H. T.M. Iliffe and J.N. Butler. 1980.
Marine Pollution Bulletin 11(6):161-164.

Sampling, Detection, Tar, Concentrations, Seawater, Bermuda

"Quantitative surveys of beach tar on Bermuda during 1978-79 are compared with similar surveys in 1971-72. A 15% increase in the mean, while not significantly different from previously observed levels, is significantly higher than the reported 27% decrease due to improvements in tanker operations."

80B-0812
DYNAMICS OF MOTION AND ALTERATION IN QUALITY OF PETROLEUM HYDROCARBONS IN SOIL AND WATER ENVIRONMENT
Lehotsky, J. (ed.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01. NTIS Report CONF-7806143. p.289-301.

Chemical analysis, Soil, Emulsions, Solution, Freshwater, Groundwater

"Petroleum hydrocarbons occur in the soil in several forms, including gases, liquids, heavy and light fractions, and dissolved and emulsified forms in aqueous solutions. Methods for the analysis of petroleum hydrocarbons in the water-soil environment are reviewed."

[from UDS Water Quality Control Digest 11(1):IV-05, #9L-200. 1980]

80B-0813
A STUDY OF HYDROCARBONS IN THE BALTIC SEA [IN ENGLISH]
Lysiak, E. 1977.
Polskie Archiwum Hydrobiologii 24(4):575-582.

Sampling, Hydrocarbons, Concentrations, Seawater, Sediments, Baltic Sea

Hydrocarbon content in Baltic waters and sediments were examined by infrared spectrophotometry in 1974 and 1975. In 1975 port water and sediments were also analyzed. "The hydrocarbons contents in the water were lower than in the open Baltic, barely exceeding 0.100 mg/l, but the sediments showed a considerable pollution level.

[from Aquatic Sciences and Fisheries Abstracts 9(1):216. 1979]

80B-0814
SEDIMENT HYDROCARBONS NEAR AN OIL RIG
Lytle, T.F. and J.S. Lytle. 1979.
Estuarine and Coastal Marine Science 9(3):319-330.

Hydrocarbons, Sampling, Platforms, Drilling, OCS, Concentrations, Distribution, Sediments, Texas

"Sediment samples were collected from 25 strategic locations at a site on the Texas shelf before placement of an exploratory oil rig, during drilling, and after 2 months of operation. Hydrocarbons in the C_{14}-C_{20} region of the aliphatic chromatograms were in low abundance, but consisted mostly of n-C_{17} and C_{25} branched-chain olefins. The high molecular weight region contained high concentrations of the odd carbon numbered n-alkanes with a predominance of n-C_{29}."

[from Pollution Abstracts 11(3):488. 1980]

80B-0815
CHEMICAL STUDIES OF OFFSHORE OIL PLATFORMS
McDermott-Ehrlich, D. and G.A. Alexander. 1977.
Annual Reports, Southern California Coastal Water Resources Project, No.77-1. p.129-135.

Chemical analysis, Biological effects, Drilling, Platforms, Sampling, Sediments, Marine organisms

"As part of the effort to determine if drilling and oil production operations had an effect on organisms found around two oil platforms, chemical analyses of the nearby sediments and of the tissues of several marine animals found in the area were made. The petroleum hydrocarbon content of all sediment samples was higher than in areas of no natural seeps, but no detectable amount of petroleum hydrocarbons were observed in any of the animals analyzed."

[from Aquatic Sciences and Fisheries Abstracts 8(3):117. 1978]

80B-0816
POSSIBLE TRACE METAL MOBILIZATION OF SELECTED TRACE ELEMENTS FROM OIL-IMPACTED SEDIMENTS
Miller, J.S., R.E. Sievers, G. Lange, J. Stanley, R.R. Meglen and E.L. King. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.238-243. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Oil spills, Analytical techniques, Source identification, *Multicomponent fluorescence

Release of trace elements could alter available concentrations, affecting marine biota. Four elements-mercury, arsenic, chromium and nickel- were targeted for study. Three of the four have not been shown to be affected by oil-sediment interaction, while work on the fourth element had not produced results yet.

[from Aquatic Sciences and Fisheries Abstracts 9(4):182. 1979]

80B-0817
THE SELF-PURIFICATION OF SEA WATERS FROM HEAVY OIL FRACTIONS
Mironov, O.G. 1979.
Gidrobiologicheskii Zhurnal 15(3):42-45.

Fate, Coastal waters, Tar, Weathering, Oxidation, Black Sea, USSR

Oil residues collected along the Black Sea shore were anlayzed for chemical composition. The first group examined was soft and sticky with a black color, and remained practically unchanged after 70 days. The second group - thick, non-sticky with a brown color - had changed considerably within the same time, with a sulfur, normal, and isoprenoid paraffin content decreased.

[from Pollution Abstracts 11(4):691. 1980]

80B-0818
QUANTITATION OF SULFUR CONTAINING OIL COMPOUNDS AND POLYCHLORINATED BIPHENYLS (PCB) IN MARINE SAMPLES
Nakamura, A. and T. Kashimoto. 1978.
Bulletin of Environmental Contamination and Toxicology 20(2):248-254.

Chemical analysis, Concentrations, Distribution, Marine organisms, Mollusks, Sediment, *Sulfur compounds

Levels of contamination of sulfur-containing oil compounds in shellfish, other marine samples and sediments were determined by gas chromatography. Polychlorinated biphenyls (PCB) levels in the same samples are also discussed.

80B-0819
HEAVY METALS AND PETROLEUM PRODUCTS IN THE NORTH, NORWEGIAN AND BALTIC SEAS
Petrov, Yu.M., O.B. Starinkova and Z.N. Kurpyakova. 1977.
Oceanology 16(5):470-473.

Sampling, Petroleum products, Seawater, North Sea, Baltic Sea

The content of heavy metals and petroleum products in north eastern Atlantic seas was studied in 1972-1973. The Baltic Sea was the most polluted with petroleum products. "A trend toward increased pollution with petroleum products was noted in 1973 as compared to 1972."

80B-0820
ANALYSIS OF ALIPHATIC AND AROMATIC HYDROCARBONS IN ANTARCTIC MARINE SEDIMENT LAYERS
Platt, H.M. and P.R. MacKie. 1979.
Nature 280(5723):576-578.

Chemical analysis, Hydrocarbons, PAH, Concentrations, Contamination, Antarctica, Sediments

"Alkane and PAH fractions were isolated from sediment cores taken from King Edward Cove, South Georgia. Despite the fact that PAH concentration is a function of sediment type as well as relative input, the concentrations analyzed were surprisingly high for such an isolated location, indicating that global contamination reaches even remote parts of the world in relatively undiminished quantities."

[from Pollution Abstracts 11(3):485. 1980]

80B-0821
HYDROCARBON POLLUTION OF SURFACE WATERS OF THE WESTERN MEDITERRANEAN. PART ONE: TAR BALLS [ENGLISH SUMMARY]
Ros, J. and F. Faraco. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.111-116.

Tar balls, Sea surface, Contamination, Concentrations, Sampling, Mediterranean Sea

This paper presents the results of three cruises of the R/V Cornide de Saavedra in 1975, 1976 and 1977, in the Western Mediterranean Sea. Pelagic tar was collected by towing a neuston net and concentrations of the tar are analyzed. More than 97% of the tows contained tar in concentrations ranging from 0.04 ng/m^2 to 77.7 mg/m^2.

80B-0822
HYDROCARBONS IN THE MARINE ENVIRONMENT OF PORT VALDEZ, ALASKA
Shaw, D.G. 1978.
Environmental Science and Technology 12(10):1200-1205.

Concentrations, Hydrocarbons, Sampling, Ports, Harbors, Sediments, Pipelines, Tankers, Coastal waters, Alaska

The results of the quantification of saturated and nonsaturated hydrocarbons in this study represent typical types and amounts of hydrocarbons in unpolluted nearshore environments. Samples for this work were collected approximately one year prior to the completion of the trans-Alaska oil pipeline. The results thus provide a data base from which to investigate the fate of oil that will be added as the tanker loading facility goes into operation.

[from Aquatic Sciences and Fisheries Abstracts 9(4):181. 1979]

80B-0823
ORGANIC GEOCHEMISTRY OF RECENT SEDIMENTS FROM GUAYMAS BASIN, GULF OF CALIFORNIA
Simoneit, B.R.T., M.A. Mazurek, S. Brenner, P.T. Crisp and I.R. Kaplan. 1979.
Deep Sea Research 26(8A):879.

Detection, Chemical analysis, Hydrocarbons, Biogenic hydrocarbons, GC/MS, Sediments, *Gulf of California

A 35 m gravity core from the Guaymas Basin in the Gulf of California was analyzed by GC, GC/MS, and stable-isotope MS for lipids, humates, kerogens and C_1-C_8 hydrocarbons. Among the hydrocarbons, biogenically derived methane was found, and the lower section of the core contained C_2-C_8 hydrocarbons of petrogenic origin.

80B-0824
HYDROCARBONS IN THE SEDIMENTS OF THE BERMUDA REGION: LAGOONAL TO ABYSSAL DEPTHS
Sleeter, T.D., J.N. Butler and J.E. Barbash. 1978.
Symposium on Analytical Chemistry of Petroleum Hydrocarbons in the Marine/Aquatic Environment. American Chemical Society, 1978. p. .
Advances in Chemistry Series.

Chemical analysis, Hydrocarbons, Coasts, Sediments, Harbors, Offshore, Bermuda

Surface sediments were sampled at 20 stations varying from lagoonal and intertidal depths to one deepwater sample from 1400 m, and chemically analyzed for hydrocarbon types. Subtidal sediments contained residues from beached pelagic tar. Outside the protective reef total aliphatic hydrocarbon concentration was less than inside the reef; lowest concentrations were at abyssal depths. Samples from shipping lane areas contained fresh petroleum traces, and harbors yielded chromatograms typical of chronic petroleum contamination.

3. Sampling and Analysis

80B-0825
OIL CHARACTERIZATION BY MULTICOMPONENT FLUORESCENCE ANALYSIS
Warner, I.M., J.B. Callis, E.R. Davidson and G. Christian. 1977.
Proceedings of a Workshop on Pattern Recognition Applied to Oil Identification, Y.T. Chien and T.J. Killeen (eds.). New York, Institute of Electrical and Electronic Engineers, 1977. p.129-135. Report IEEE-76CH1247-6C.

Oil spills, Analytical techniques, Source identification, *Multicomponent fluorescence

"Algorithms using an emission-excitation matrix are presented for the processing of multicomponent fluorescence data, to achieve an efficient dimensionality reduction for input to pattern recognition programs for the identification of oil spills."

[from Aquatic Sciences and Fisheries Abstracts 9(4):179. 1979]

80B-0826
OIL AND TAR ON SANTA BARBARA REGION BEACHES
Welday, E.E. 1977.
California Offshore Gas, Oil, and Tar seeps. Sacramento, California State Lands Commission, 1977. p.347-371.

Exploration, Production. Offshore, Sampling, Beaches, Tar, Natural seepage, Sources, Distribution, Santa Barbara Channel, California

"With increasing petroleum exploration, development activities and tanker traffic, there has been considerable public demand for frequent appraisal of the magnitude and sources of oil and tar on the beaches." This report describes a few inspections and samplings of Santa Barbara Channel beaches over a three year period.

4. Source Identification

80B-0827
SOURCES OF MARINE OIL POLLUTION [NEWS BRIEF]
Anon. 1978.
Lloyd's List No.50873:1.

Source identification, Oil spills, Contamination, Sweden, Offshore, Drilling, Natural seepage, Onshore, Refineries, Oil transfer, Tankers, Ships

A. OIL SPILL DETECTION, ANALYSIS AND EVALUATION

4. Source Identification

The National Academy of Science of Sweden outlines the sources of 6.1 million tons of oil that ends up in the sea as follows: 41% reaches the sea from rivers, port entrances, and onshore activities; 11% comes from natural seepage and oil drilling operations; 10% from precipitation; 30% from refineries; 18% caused by handling of ships; 10% handling and wrecking of ships other than tankers; and 3% from accidents (groundings, explosions) of tankers.

[from Aquatic Sciences and Fisheries Abstracts 8(9):147. 1978]

80B-0828
SOURCE IDENTIFICATION OF TAR BALLS FROM THE WESTERN MEDITERRANEAN
Albaiges, J., J. Borbón and J. Ros. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey
24-27 November 1978. Monaco, CIESM, 1979. p.103-110.

Source identification, Chromatography, Tar balls, Sampling, Sea surface, Oil discharges, Tankers, Coasts, Spain, Italy, Mediterraean Sea

This paper discusses a chromatographic method for determining the origin of pelagic tar balls and its application to source identification of samples collected between the Spanish and Italian coasts during the cruise of CONMEDOC II (July 1977). The origin of the tar balls is concluded to be primarily from discharged oil tanker washings.

80B-0829
NATURAL TAR SEEPS AND ASPHALT DEPOSITS OF SANTA BARBARA COUNTY
Priestaf, I.G. 1980.
Shore & Beach H8(2):15-20.

Source identification, Natural seepage, Tar, Coasts, Santa Barbara Channel, California, Intertidal zone, Beaches, *Asphalt deposits

Extensive natural tar seeps and asphalt deposits along the Santa Barbara Coast at More Mesa and Carpinteria are described. Although the common perception of these natural seeps is one of an environmental blemish, associated with oil spills and beach tar, this article emphasizes the fact that they historically were, and still are, a natural resource.

80B-0830
HYGIENIC CHARACTERISTICS OF THE CONTAMINATION OF SEAS AND OCEANS [IN RUSSIAN]
Sidorenko, G.I. 1978.
Hygiene and Sanitation, No.8:74-79.

Source identification, Contamination, Petroleum products, International conventions, Pollution control, USSR

A general account is given of the contamination by man of the seas with metals, pesticides, radioactive materials, synthetic surfactants, plastics and hydrocarbons (especially petroleum and its products). Topics include source of contamination, effects (including microorganic and viral activity), Soviet legal measures of prevention in coastal waters, USSR-initiated international conventions and a listing of current studies.

[from Aquatic Sciences and Fisheries Abstracts 9(5):135. 1979]

80B-0831
IDENTIFICATION OF HYDROCARBON MARKERS IN OIL-POLLUTED WATERS BY USE OF COLUMN AND THIN-LAYER CHROMATOGRAPHY
Whittle, P.J. 1977.
Analyst 102(1221):976-978.

Source identification, Chemical analysis, Chromatography, Hydrocarbons, Equipment

Chemical markers added to duty free gas oils are quinizarin, furfuraldehyde, and Solvent Red. A new method for the identification of quinizarin and Solvent Red 24 and the experimental apparatus and procedure are described.

[from Aquatic Sciences and Fisheries Abstracts 8(6):138. 1978]

80B-0832
CORRELATION OF OILS AND OIL PRODUCTS BY GAS CHROMATOGRAPHY
Zafiriou, O., M. Blumer, J. Myers and D. Stainken. 1977.
Environmental Protection Agency, Environmental Protection Technology Series, Report EPA-600/2-77-163. 90p.

Source identification, Chromatography, Oil slicks, Monitoring, Marine organisms, Sediments

"The gas chromatographic method is presented for identifying the discharge source of petroleum oil pollutants found as slicks and shoreline residues." This technique known as 'fingerprinting' was found to have a high rate of success in routine situations and to be suitable for monitoring levels of hydrocarbons in organisms and sediments.

[from Aquatic Sciences and Fisheries Abstracts 8(5):197. 1978]

80B-0833
ESTIMATE OF THE SOURCE OF A PHREATIC AQUIFER POLLUTION BY HYDROCARBONS: OIL-WATER CONTACT AND TRANSFER OF SOLUBLE SUBSTANCES IN GROUNDWATER.
Zilliox, L. et al. (eds.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01, NTIS Report CONF-7806143. p.209-237.

Source identification, Contamination, Ground water, Chemical effects, Petroleum products

"Infiltration of hydrocarbons from the ground surface to the water table and the mechanisms of transfer were studied. Velocities of infiltration of various hydrocarbon fractions in wet and dry soils were investigated. The effect of a well on a layer of petroleum products at the water table was evaluated. Various compositions of gas-oil, toluene, and isooctane were used to examine exchanges between oil products and groundwater."

[from UDS Water Quality Control Digest 11(2):II-22, #9L-302. 1980]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

1. Containment

80B-0834
DYNAMICS OF OIL BARRIERS [NEWS BRIEF]
Anon. 1978.
Norwegian Maritime Research 6(3):41.

Spill containment, Behavior, Booms, Physical effects, Design-engineering, Equipment, Performance testing

The Ship Research Institute of Norway at Trondheim structured the title research project to investigate, via theory and model tests, the hydrodynamics of design and handing of oil barriers under rough water conditions. Development of the testing technique and of recommendations for oil barrier construction comprise the body of the work. The project was initiated in 1976 and scheduled for completion in 1978.

[From Aquatic Sciences and Fisheries Abstracts 9(5):128. 1979]

80B-0835
THE ZOOOM BOOM
[Bennett Pollution Controls]. 1978.
Canadian Shipping and Marine Engineering 49(4):14-16.

Spill containment, Booms, Design-engineering, Product information

This is a technical article describing the design and function of the title product, a self-inflating, fast response, first-line-of-defense oil containment barrier, by a Vancouver-based company.

[from Aquatic and Sciences and Fisheries Abstracts 9(2):209. 1979]

80B-0836
CONTAINMENT OF OIL AND OIL SLUDGES
Edgar, A.C. and G.N. Smith.
U. S. Patent 4,144,162

Waste oil treatment, Disposal, Sludge, Patent

Waste oils and sludges are mixed in a 60:40 ratio with Fuller's earth, and the mixture is allowed to harden and is then disposed in a conventional landfill.

[from Chemical Abstracts 91(1): #9,180v. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

1. Containment

80B-0837
FAST RESPONSE SPILL CONTAINMENT [NEWS BRIEF]
[Evergreen Helicopters Inc.] 1977.
Petroleum Engineering International 49(7):12.

Spill containment, Booms, Equipment, Product information, *Collectant spraying

The ASC (Airborne Spill Control) system was developed by Evergreen Helicopters Inc. for use with Sikorsky S-61 and Bell 212 helicopters. It weighs 705 lbs. and consists of a 612 gallon tank with adjustable nozzles, spray booms, and a self-contained motor. The collectant is sprayed around the spill which prevents the oil from spreading, until clean-up equipment arrives.

[from Aquatic Sciences and Fisheries Abstracts 8(2):173. 1978]

80B-0838
BOOMS USED FOR OIL SLICK CONTROL
Lam Lau, Y. and J. Moir. 1979.
American Society of Civil Engineers. Environmental Engineering Division. Journal 105(EE2):369-382.

Spill containment, oil slicks, Physical aspects, Booms

"Experiments were conducted to determine the conditions for no containment of oil by a boom, the oil-water interfacial friction coefficient, and the maximum angle which a boom can be angled to the flow to deflect an oil slick. An empirical relationship was derived for the maximum angle at which a barrier could be angled to the flow to completely divert an oil slick."

[from Pollution Abstracts 11(2):265. 1980]

80B-0839
BOTTOM-TENSIONED OIL BOOM [NEWS BRIEF]
[Lucander Designs] 1977.
Dock and Harbour Authority 58(683):256.

Spill containment, Booms, Equipment, Product information

The Lucan boom, developed by Lucander Designs, Brownsville, Texas, is an improvement over top anchored booms which allow skirts to swing in a current causing oil to spill underneath. Other advantages of this boom are discussed.

[from Aquatic Sciences and Fisheries Abstracts 8(3):104. 1978]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

1. Containment

80B-0840
NEW OIL BAR FROM NOFI A/S [NEWS BRIEF]
[NOFI A/S]. 1978.
Holland Shipbuilding 27(2):60.

Spill containment, Booms, Design-engineering, Equipment, Product information

The oil bar, which protected the Norwegian coast against the major oil spill on the Bravo platform in the Ekofisk field, looks like a tennis net and hangs straight into the sea to a depth of about 2 meters. Its design and successful clearing operation is discussed.

[from Aquatic Sciences and Fisheries Abstracts 8(11):228. 1978]

80B-0841
SYNTHETIC OIL SORBENTS
[3-M Company]. 1978.
Canadian Shipping and Marine Engineering 49(4):17,26.

Spill containment, Absorption, Booms, Equipment, Sorbents, Product information

Mechanical booms are effective containment devices under relatively calm conditions, and where spills are at least 0.5 in thick; currents above one foot per second, thinner spills, and close inshore or rough conditions cannot be effectively surmounted. "New, synthetic oil sorbent materials, such as those developed by 3M, are designed to cope with smaller, inshore and onshore spills, and to complement booming and skimming techniques. They can also be used as 'first aid' treatment in inaccessible sites because of their ease of handling and storage." 3M brand oil sorbents are described in terms of six forms of application: booms, pillows, rolls, sheets, sweeps and particulates.

[from Aquatic Sciences and Fisheries Abstracts 9(2):210. 1979]

80B-0842
A BOOM FOR HOSTILE SEAS
[Vikoma International Ltd.] 1978.
Canadian Shipping and Marine Engineering 49(4):16.

Booms, Spill containment, Equipment, Design-engineering, Product information

The article presents the objectives BP has set for design of a boom suitable for handling huge drilling spills in hostile waters; the subsequent product, Oceanpack, is described in design and functional detail.

[from Aquatic Sciences and Fisheries Abstracts 9(2):210. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

1. Containment

80B-0843
HEAVY DUTY SPILL CONTROL SYSTEM DEVELOPED BY BRITISH PETROLEUM [NEWS BRIEF]
[Vikoma International Ltd.] 1979.
Sea Technology 20(1):53.

Spill containment, Booms, UK, Equipment, Production information

A heavy duty oil containment boom and self-contained boom deployment and recovery module was developed by British Petroleum Ltd. and will be marketed by Vikoma International Ltd., Weybridge, Surrey, U.K. The package contains 500m of boom and an inflation system, and can be deployed in about 20 minutes.

2. Cleanup and Removal

80B-0844
DREDGER CUM OIL SPILL RECOVERY SHIP [NEWS BRIEF]
Anon. 1979.
Pollution Monitor, No. 47:12.

Spill cleanup, Equipment, Ships, Oil removal, Oil-water separation

This vessel is a trailing-suction hopper dredger with a hopper capacity of ≈ 5,000m³. Special arms carried as shipboard equipment which are lowered to the surface, will clear a 50-year path with wide sweeps. "Oil is then conducted to port and starboard collectors where it is drawn into centrifugal pumps and conveyed to the hopper. Finally, it is separated and stored in tanks or transferred to a tanker."

[from Pollution Abstracts 11(2):248. 1980]

80B-0845
THE ELENI V OIL SPILL [NEWS BRIEF]
Anon. 1978.
Pollution Monitor, Vol. 44:17.

Spill cleanup, Performance testing, Skimmers, Equipment, Product information, *Eleni V spill

The performance and operational cost of the MK II-9 and MK II-4 Oil Mop machines during the Eleni V oil spill are reviewed.

[from Aquatic Sciences and Fisheries Abstracts 9(4):180. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

2. Cleanup and Removal

80B-0846
EPA 'CLEAN-UP' GUIDE [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(3):60.

Guidelines, Manuals, EPA, Spill cleanup, Shoreline, Spill response

The Environmental Protection Agency has released a comprehensive manual to guide teams dealing with oil spill clean-up operations entitled 'Manual for the Protection and Cleanup of Shorelines.' Composed of two volumes, number 1 'Decision Guide' gives details on how to gather information on a spill, and to assess the type and extent of it. Volume 2, 'Implementation Guide', presents detailed instructions on protection and clean-up operations.

80B-0847
FOR CRUDE CLEANUPS [NEWS BRIEF]
Anon. 1980.
Science News 117(22):349.

Spill cleanup, Crude oil, Absorption, Sorbents, Product information, *Bregoil

"Bregoil", a cellulose-derived product resembling swollen sawdust is being tested for oil spill removal. The substance absorbs oil but not water, and its Swedish inventor Bo Grenthe, claims that the material is not only "cheaper than detergents used to absorb oil, but it also should prove far less toxic to fish and other biota."

80B-0848
A PIRANHA AT SEA [NEWS BRIEF]
Anon. 1978.
Pollution Monitor No. 41:31.

Spill cleanup, Equipment, Skimmers, Product information

The Piranha oil skimmer was originally intended for harbor clean-up, but has performed in open waters. The vessel is designed so that heavy oil adheres to steel perforated belts lowered into the water, while light oil and water flow through. The light oil is further captured using smooth stell belts moving vertically.

[from Pollution Abstracts 10(2):290. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL
2. Cleanup and Removal

80B-0849
ROPE GOES TO SEA IN SEARCH OF OIL SPILLS [NEWS BRIEF]
Anon. 1978.
New Scientist 79(1113):275.

Spill removal, Absorption, Sorbents, Product information, *Polypropylene rope

An oil recovery device, tested at Britain's Warren Spring Laboratories in Stevenage, is a mop made out of polyproplylene straws which absorbs oil and rejects water. Tests indicate that the system should be able to extract up to 170 tonnes per hour using a 2000m rope.

[from Aquatic Sciences and Fisheries Abstracts 8(11):227-228. 1978]

80B-0850
ADVANCES IN OIL DISPERSANTS
[Biggs Wall and Co. Ltd.] 1977.
Dock and Harbour Authority 58(681):178-179.

A portable oil dispersion unit designed for removing residual oils from vertical surfaces has been developed by Biggs Wall and Co. Ltd. The equipment weighs 23kg. mounted on a trolley and contains two 9L drums with hand operated pressure pumps, hose, mixing valves, and hand lance. The operation and oil dispersant mixture used is discussed.

[from Aquatic Sciences and Fisheries Abstracts 8(2):173. 1978]

80B-0851
DISPERSANTS FOR OIL SPILL CLEAN-UP OPERATIONS AT SEA, ON COASTAL WATERS AND BEACHES
Cormack, D., B. Lynch and J. Smith. 1979.
Stevenage, England Warren Spring Laboratory. Report, LR 316 (OP), 9p.

Spill cleanup, Dispersants, Coastal waters, Beaches, UK

General background information and guidelines concerning the formulation, composition, and usage of materials intended to disperse oil is provided. Details of the specification for dispersants and the procedure to be followed in submitting dispersants for approval are described. "Relevant Warren Spring publications concerning usage of dispersants are listed."

[from Pollution Abstracts 11(4):694-695. 1980]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

2. Cleanup and Removal

80B-0852
EMISSIONS FROM IN SITU BURNING OF CRUDE OIL IN THE ARCTIC
Day, T., D. Mackay, S. Nadeau and R. Thurier. 1978.
Water, Air and Soil Pollution 11(2):139-152.

Spill removal, Crude oil, Burning, Arctic, Environmental effects

In the title study, the results of the effects of in situ crude oil spill burning on air in the Beaufort Sea region of the Arctic are presented. Included is a scenario postulating the amounts of oil released, the size and number of burnable oil pools, and the duration of the burning period. Burning may be a method for reducing the environmental impact of oil spills in the Arctic.

80B-0853
A SELECTED BIBLIOGRAPHY ON OIL SPILL DISPERSANTS
Doe, K.G. G.W. Harris and P.G. Wells. 1978.
Ottawa, Canada, Department of Fisheries and Environment, Environmental Impact Control Directorate, 1978. Economic and Technical Review Report EPS-3-EC-78-2. 98p.

Spill cleanup, Dispersants, Bibliographies, Canada

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:85, #4251. 1979]

80B-0854
AID OF GEOPHYSICAL METHODS IN OIL SPILL CLEANUPS
Dolezal, J. (ed.). 1978.
International Symposium on Ground Water Pollution, Prague, Czechoslovakia, June 1978. Report PC A14/MF A01. NTIS Report CONF-78-06143. p.319-330.

Spill cleanup, Equipment, *Geophysical methods

"The feasibility of the use of geophysical methods in cleaning up oil spills is briefly surveyed. The geophysical methods, in combination and cooperation with other desciplines, supply a series of positive results in aiding in the fast and efficient cleanup of oil spills."

[from UDS Water Quality Control Digest 11(2):II-21, #9L-203. 1980]

80B-0855
DISPERSANTS FOR THE ELIMINATION OF OIL SPILLS
Estrades, M. and J.R. Bergueiro. 1980.
Progress in Water Technology 12(1):35-48.

Spill response, Dispersants, Dispersion, Crude oil

"The object of this work is to determine the minimum quantity of dispersant that may be used to obtain optimum dispersion as a function of a series of variables with respect to time of mixing, velocity of mixing, type of mixer, temperature, etc." It is concluded that dispersion of crude oil is more influenced by the velocity of mixing than by the ratio of dispersant to oil.

80B-0856
THE FRANK MOHN OIL SKIMMER UNIT [NEWS BRIEF]
[Frank Mohn Co.] 1978.
Shipping and World Shipbuilding 171(3937):97.

Spill cleanup, Skimmers, Performance testing, Product information, *Bravo blowout

The Framo oil skimmer designed by Frank Mohn was developed to recover large quantities of oil from the sea surface at rates of up to 400m^3/hr. The Framo portable hydraulically-operated submerged pump is of the type used worldwide as an emergency offloading pump. The Framo system was the only successful skimmer in the Bravo blowout emergency in April 1977.

[from Aquatic Sciences and Fisheries Abstracts 8(8):173. 1978]

80B-0857
THE APPLICATION OF WASTE SYNTHETIC FIBRES TO REMOVE OIL SPILLS FROM WATER SURFACES
Hupka, J. and S. Mydlarczyk. 1979.
Oceanologia No.11:113-128.

Spill removal, Spill cleanup, Sorbents, *Scrap tire fibers

"Cord from scrap tires, composed of 60% viscose rayon, 38% polyamide fibers, and 2% small particles of rubber adhering to the fibers, was tested as an absorbent to remove crude oil or Lux 10 engine oil from water surfaces. Becuase of its high sorption and regeneration possibility, this type of absorbent can be economically competitive to cheap materials such as straw or sawdust."

[from Pollution Abstracts 11(3):484. 1980]

80B-0858
OIL DISPERSANT [NEWS BRIEF]
Isaac Bentley & Co. Ltd. 1977.
Offshore Services 10(11):77.

Spill cleanup, Dispersants, Product information, Biological effects

The product discussed, Fleetex BD/3, made by Isaac Bentley and Co. Ltd. of Liverpool, UK, is biologically acceptable and will not damage marine life when used to clear oil spills at sea or in waterways.

[from Aquatic Sciences and Fisheries Abstracts 8(7):151. 1978]

80B-0859
CATAMARAN SKIMMER
[Lockheed Missiles and Space Co. Inc.]. 1978.
Canadian Shipping and Marine Engineering 49(2):45-46.

Spill cleanup, Skimmers, Equipment, Product information

"Reported to be capable of recovering spilled oil in 1.5 m (5 ft.) seas, and 1-knot currents, a new type of skimmer has been designed for catamaran or other craft that will supply the rotating and pumping power required." Lockheed's Clean Sweep, the largest of the manufacturer's disc skimmers, Type 8000, can respond to the sea surface independently of the craft.

[from Aquatic Sciences and Fisheries Abstracts 9(2):210. 1979]

80B-0860
FOR OFFHSORE OIL-SPILL CLEANUP [NEWS BRIEF]
Lockheed Missiles and Space Co. Inc. 1977.
Holland Shipbuilding 26(5):47.

Spill cleanup, Skimmers, Equipment, Product information

The Clean Sweep skimmer was designed by Lockheed to fit into large vessels used to clean up offshore oil spills. Its variable size and capacity is examined.

[from Aquatic Sciences and Fisheries Abstracts 8(6):136. 1978]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

2. Cleanup and Removal

80B-0861
PROBLEMS PRESENTED BY ICE COVER TO OILSPILL CLEAN-UP IN THE BEAUFORT SEA
McGonigal, D. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. MacKay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.13-25. Publication No. EE-14.

Spill cleanup, Spill response, Arctic, Ice, Canada, Beaufort Sea

A descriptive summary of the sea ice regions in Canada, the Beaufort Sea ice coverage and oilspill clean-up operations in this region is accompanied by a series of seasonal photographs on the ice cover of the Beaufort Sea.

80B-0862
MARCO SKIMMER STATIONED AT ENGLISH TERMINAL [NEWS BRIEF]
[Marine Construction and Design Co.] 1979.
Sea Technology 20(10):43.

Spill cleanup, Skimmers, Product information, Equipment

MARCO of Seattle, Washington, has delivered an 11-m oil spill skimmer to Phillips Petroleum for use in the North Sea's Ekofisk field. The design of the vessel and its capabilities are described. Oil recovery and offload rate is about 280 barrels per hour.

80B-0863
DISC SKIMMERS MAKE AN IMPACT
[Morris Industries]. 1978.
Canadian Shipping and Marine Engineering 49(4):17.

Skimmers, Spill cleanup, Equipment, Product information

"This article looks at oil skimmers manufactured by the Vancouver based company of Morris Industries. The skimmers operate on the rotating disc principle and they have been shown to remove all types of oil, even in the presence of debris. The article also examines some of the instances in which these types of skimmers have been used."

[from Aquatic Sciences and Fisheries Abstracts 9(2):209. 1979]

80B-0864
THE NAVIRE ANTI-POLLUTION VESSEL [NEWS BRIEF]
[Navire Co.] 1978.
Shipping and World Shipbuilding 171(3937):101.

Spill cleanup, Ships, Design-engineering, Pollution control, Wastewater treatment, Emulsions, Disposal

"Navire has developed, in cooperation with Neste Oy, the Finnish refinery and oil company, a new concept of a pollution fighting vessel for reception of oily waste water, waste oil, oil emulsions and hazardous waste, which can be stored, treated, used, or destroyed onboard." It can also be used as a base for skimmers, oil-collecting boats, and a crew needed for operation.

[from Aquatic Sciences and Fisheries Abstracts 8(8):173. 1978]

80B-0865
AN OIL SKIMMER FROM OIL MOP INC. [NEWS BRIEF]
[Oil Mop Inc.] 1978.
Shipping and World Shipbuilding 171(3937):99.

Spill cleanup, Skimmers, Equipment, Product information, Sorbents, *Rope mops

This oil clean-up vessel consists of a series of continuous loop rope mops which are laid in the water at the bow and are pulled to the stern, absorbing oil along the way. Tests indicate a recovery rate of 35t/hr, at a forward speed of up to 6 knots, and the recovered oil can be stowed in the catamaran hulls.

[from Aquatic Sciences and Fisheries Abstracts 8(10):94. 1978]

80B-0866
AIR SPARGING TO REMOVE DISSOLVED HYDROCARBONS FROM RIVER WATER UNDER WINTER ICE CONDITIONS
Peake, E. 1980.
Spill Technology Newsletter 5(2):44-54.

Oil removal, Oil-water separation, WSF, Hydrocarbons, Rivers, Freshwater, *Aeration

This report presents results of a study of air sparging (aeration) as a means of removing dissolved hydrocarbons from oil-contaminated freshwater. Additional objectives of the study included the identification of hydrocarbons that cause taste and odor in water, evaluation of the toxicity of contaminated water, and the effect of aeration upon toxicity, taste and odor of contaminated water. Air sparging can significantly decrease concentrations of aliphatic hydrocarbons, but has less effect on the aromatics; aeration can decrease toxicity and odor, but may in some instances aggravate taste problems.

80B-0867
THE CYCLONET: A DEVICE FOR REMOVING OIL SLICKS FROM THE WATER SURFACE [IN FRENCH]
Pichon, J. 1977.
Bulletin de l'Association Technique Maritime et Aeronautique, No. 77:85-91.

Skimmers, Equipment, Design-engineering, Product information

The Cyclonet was developed by Alsthom Atlantique, Techniques des Fluids to be: 1) ready for action at short notice; 2) highly efficient: mixture removed contains 80-100% pollutant; 3) an uncomplicated design with no moving parts below water surface; 4) opeated in rough water; 5) adaptable to various types of crafts; 6) used with a boat engine as its only power source.

[from Aquatic Sciences and Fisheries Abstracts 8(9):143. 1978]

80B-0868
DISPOSAL SYSTEMS AND TECHNIQUES FOR OIL AND HAZARDOUS CHEMICALS RECOVERED FROM MARINE SPILLS
Ross, D.E., W.G. Hansen, J.G. Kuykendall and L.P. Erdberg. 1977.
US Coast Guard Report CG-D-35-79, Contract No. DOT-CG-71044-A. 316p.
NTIS Report AD-A074 905.

Spill disposal, Equipment, Product information, Design-engineering, Spill cleanup, *Debris disposal

Existing and planned equipment systems are presented for transport and disposal of spill cleanup debris. For oil spills, 13 disposal equipment systems are summarized in terms of operational conditions, applicability to different types of oil, and capacity for solid debris constituents. Additional information on cost, dimensions and weight of key equipment, transportability and personnel requirements are provided.

80B-0869
NEW OIL SKIMMER [NEWS BRIEF]
Shell Development Company. 1980.
Marine Pollution Bulletin 11(1):3.

Spill cleanup, Skimmers, Booms, Design-engineering, Equipment, Performance testing, Oil-water separation, Product information

Shell Development Company has produced an oil skimmer which can gather up to 330 gallons of oil a minute, travelling in 8 ft. waves at 2 knots. The Spilled Oil Containment Kit (SOCK) includes a floating skimmer boom, a hydraulic power pack and pump, and an oil/water separator.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

2. Cleanup and Removal

80B-0870
THEORETICAL ASSESSMENT AND DESIGN STUDY OF THE AERIAL APPLICATION OF OIL SPILL DISPERSANTS
Smedley, J.B. 1980.
Spill Technology Newsletter 5(2):31-40.

Dispersants, Spill cleanup, Equipment, *Aerial application

Fundamental components of successful aircraft application of dispersants are identified and discussed. They include the aircraft type, speed, dosage rate and the types of nozzles responsible for dispersant droplet sizes; atmospheric transport - the way in which the dispersant is transferred fromthe aircraft to the ocean surface; and the dispersant-oil-water interactions at the ocean surface.

80B-0871
WEAPON AGAINST OIL POLLUTION [NEWS BRIEF]
[Snamprogetti]. 1977.
Offshore Engineer, No. 10:56.

Spill cleanup, Surfactants, Sorbents, Product information, *Sawdust

The product that Snamprogetti has developed in mainly sawdust, activated by biodegradable, non-toxic surfactants. Since it floats, it affects only the surface water and is particularly efficient for reducing the area of thin polluting oil film on calm surfaces. The use in rough seas will obviously have certain limitations.

[from Aquatic Sciences and Fisheries Abstracts 8(8):173. 1978]

80B-0872
ICE AND OIL RESEARCH AT HYDRAULICS RESEARCH DIVISION NATIONAL WATER RESEARCH INSTITUTE
Tsang, G. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. MacKay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.33-36. Publication No. EE-14.

Spill containment, Spill cleanup, Rivers, Ice, Canada, Cold climates

An explanation of the title cold environment hydraulics research facilities is included with a brief summary of an ice-oil boom project and a slot-cutting technique used to recover oil spilled under river ice cover.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

2. Cleanup and Removal

80B-0873
OIL SPILL RECOVERY WITH MAGNETICALLY RETRIEVABLE SORBENTS. PRELIMINARY PERFORMANCE REPORT OF MAG-1, A 24-FOOT MAGNETIC TYPE RECOVERY VESSEL FOR LIGHT OILS.
Turbeville, J.E. 1977.
Annual Combined Conference MTS/IEEE, IEEE-77-CH-1272-4-OEC, Los Angeles, 17 Oct 1977. New York, NY IEEE, 1977. p.33E1-33E6.

Spill removal, Sorbents, Performance testing, Cost analysis, Equipment, Product information

The production of 'ferrofoam', a magnetically retrievable sorbent material, and the test procedures employed to analyze the essential operational functions of the recovery unit are presented. "Sorbent requirements oil recovery rates, limitations, and a cost to benefit analysis are discussed in detail."

[from Aquatic Sciences and Fisheries Abstracts 8(8):172. 1978]

80B-0874
CLEANING SPILLED OIL [BOOK REVIEW]
Wardley-Smith, J. 1980.
Marine Pollution Bulletin 11(4):111.

Spill cleanup, Spill response, Onshore, Freshwater, Rivers, Lakes, Canada

The book entitled *The Basics of Oil Spill Cleanup* [Canadian Environmental Impact Control Directorate. Hull, Quebec, Canadian Government Publishing Centre, 1979. __p.] is summarized and reviewed. "This book is a good introduction to the cleanup of oil spills onto land and into fresh water... particulary useful to those living in the more temperate zones of North America."

3. Environmental Restoration

80B-0875
OILED SEABIRDS GET IN THE SWIM [NEWS BRIEF]
[International Bird Rescue Research Center]. 1978.
New Scientist 78(1100):213.

Restoration, Birds, Recovery, *Seabird rehabilitation

This article outlines a handbook entitled Saving Oiled Seabirds, prepared by the International Bird Rescue Research Center in Berkeley, California, under a grant from the American Petroleum Institute. Some of the topics covered are: use of medications, feeding schedules, and how to set up a rehabilitation center.

[from Aquatic Sciences and Fisheries Abstracts 8(9):153. 1978]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

3. Environmental Restoration

80B-0876
OIL AND WATERFOWL - A POLICY STATEMENT
Solman, V.E.F. 1980.
Spill Technology Newsletter 5(2):41-43.

Wildlife, Birds, Restoration, Pollution control, Canada

This statement outlines the Canadian Wildlife Service's policy in effect since 1975. The Service will cooperate with activities aimed at pollution prevention and cleanup, with cleaning, handling, and restoration of birds, with enforcement of Migratory Bird Regulations pertinent to damge by oil, and with research on oil ingestion by birds.

4. Personnel Training

80B-0877
ARCTIC OIL SPILL TALKS [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(3):59-60.

Contingency planning, Government agencies, US, Canada, Spill response, Coasts, *Workshop

A 3-day Oil Spill Workshop, held in Inuvik, was attended by Canadian and US government agencies along with various petroleum agencies. The workshop concentrated on the Beaufort Sea coast and included a series of lectures and field trips. General suggestions and recommendations include more detailed training for those working on shoreline cleanup, determination of the effects of dispersants in the nearshore zone, impacts of dyking in sensitive backshore areas and further study of the use of in situ burning as a shoreline clean-up technique.

80B-0878
5 MILLION £ TO FIGHT POLLUTION [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(3):60.

Pollution control, Equipment, Spill response, UK

British Petroleum is expanding its emergency oil spill contingency plan by increasing the size of its equipment pool, hiring more full-time specialists, and, especially, establishing a permanent water-front base for training people to handle oil emergencies and to develop oil removal and spill recovery equipment. Over £2 million will be spent on research dealing with oil pollution problems such as heavy fuel oils and oil/water emulsions.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL
5. Contingency Planning and Spill Response

80B-0879
CONTINGENCY PLANNING GUIDE PUBLISHED FOR NEW YORK BIGHT [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(4):45,47.

Contingency planning, Guidelines, Manuals, Fisheries, New York, Coastal waters

NOAA recently published a guide to contingency planning for oil spills in the New York Bight, prepared by NOAA's Environmental Data and Information Service. The manual summarizes environmental data and resource information, including climate, movement of oil at sea, location of fisheries and other resources, and shows how an oil spill might affect resources at different seasons. The "Climatological Oil Spill Planning Guide: No. 1, the New York Bight" is available free from the Environmental Data and Information Service; CEAS/MEAD, NOAA, 3300 Whitehaven St., Washington, DC. 20235

80B-0880
NAVY AIDS RESPONSE EFFORTS IN IXTOC, BURMAH AGATE SPILLS [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(2):47.

Spill response, Spill cleanup, Equipment, USN, Ixtoc I blowout, Gulf of Mexico, Texas, *Burmah Agate spill

The US Navy Supervisor of Salvage of the Naval Sea Systems Command has provided skimmers, booms, and other equipment for use in spill response during the Ixtoc I well blowout, and the Burmah Agate tanker spill of November 1, 1979. Navy participation in these incidents is detailed.

80B-0881
NORWAY PUTS FORWARD ANTI-POLLUTION PROPOSAL [NEWS BRIEF]
Anon. 1978.
Lloyd's List, No. 50868:3.

Contingency planning, Spill response, Pollution prevention, Norway

A four-year oil pollution and development program aimed at improving existing technology and furthering emergency contingency development, proposed by the Norwegian government, is presented.

[from Aquatic Sciences and Fisheries Abstracts 8(9):2. 1978]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

5. Contingency Planning and Spill Response

80B-0881
NORWAY PUTS FORWARD ANTI-POLLUTION PROPOSAL [NEWS BRIEF]
Anon. 1978.
Lloyd's List No. 50868:3.

Contingency planning, Spill response, Pollution prevention, Norway

A four-year oil pollution and development program aimed at improving existing technology and furthering emergency contingency development, proposed by the Norwegian government, is presented.

[from Aquatic Sciences and Fisheries Abstracts 8(9):2. 1978]

80B-0882
OIL POLLUTION RESEARCH THINLY SPREAD [NEWS BRIEF]
Anon. 1978.
New Scientist 80(1125):157.

Spill response, UK, English Channel, Dispersants, Equipment, Contingency planning

The House of Commons Select Committee on Science and Technology in its Fourth Report (18 October 1978), criticizes British preparedness in the area of large oil spills. It is concluded that Department of Trade preparations in the English Channel bear no relation to probably size of any oil pollution accident, leaving the south coast unprotected. The Report suggests two remedies: one involves placing limited stocks of dispersant and spraying equipment at strategic points; the other recommends contingency plans to provide for rapid concentration of equipment when and where necessary.

[from Aquatic Sciences and Fisheries Abstracts 9(2):206. 1979]

80B-0883
POLLUTION CONTROL TECHNIQUES SLOWLY DEVELOPED FOR ARCTIC [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(4):45.

Spill response, Ice, Arctic, Canada, Spill containment, Spill cleanup, Monitoring, Incineration, *AMOP program

The Canadian Arctic Marine Oilspill Program (AMOP), started in 1977, is reviewed. The program has helped to develop spill cleanup and containment devices, incineration gear, dispersant equipment and strategies, remote sensing techniques, and shoreline cleanup methods.

80B-0884
ALASKAN BEAUFORT SEA OILSPILL RESPONSE BODY
Allen, A.A. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. MacKay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies 1979. p.129-132. Publication No. EE-14.

Contingency planning, Spill response, Alaska, Beaufort Sea

The title organization -ABSORB- is a joint venture established on March 1, 1979 by 13 oil companies interested in offshore exploration and development activities off the North Slope of Alaska. The author discusses the internal structure of and developments made by ABSORB, on a comprehensive oil spill contingency plan for the Arctic.

80B-0885
OIL SPILL RESPONSE COMPANY FORMED TO COVER N.Y. HARBOR [NEWS BRIEF]
[Clean Venture, Inc.] 1977.
Sea Technology 18(11):36.

Spill response, Contingency planning, Pollution control, Spill cooperatives, Ports, Harbors, New York

Clean Venture, Inc. is an oil spill control organization formed by four companies in the N.Y. area, Seal and Environmental Engineering, Inc. of Milford, Conn., Industrial Marine Service, Inc., of Norfold, Va., Jet Line Services, Inc., of Boston, and Reynolds Shipyard Corp. on Staten Island. They will cover the port area from bases in New York and New Jersey for a wide range of oil spills.

[from Aquatic Sciences and Fisheries Abstracts 8(7):147. 1978]

80B-0886
FIELD MANUAL FOR COLD CLIMATE OIL SPILLS
Deslauriers, P.C. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. MacKay and S. Paterson (eds.) Ontario, Canada, University of Toronto Institute for Environmental Studies 1979. p.95-101. Publication No. EE-14.

Spill response, Manuals, Guidelines, Cold climates, EPA

An oil spill response manual for on-scene coordinators responding to spills in cold regions was recently completed for the U.S. Environmental Protection Agency (EPA) and is available from the E.P.A office in Edison, New Jersey. An outline of the contents is presented.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL
5. Contingency Planning and Spill Responses

80B-0887
MANUAL OF PRACTICE FOR PROTECTION AND CLEANUP OF SHORELINES. VOLUME 1. DECISION GUIDE.
Foget, C.R., E. Schrier, M. Cramer and R. Castle. 1979.
US Environmental Protection Agency, Report EPA-600/7-79-187a,
Contract No. 68-03-2542. 20p. NTIS Report PB-80-108 830.

Manuals, Guidelines, Spill cleanup, Personnel training, Shorelines, Beaches, Equipment

The purpose of the title manual is to provide the on-scene field user with a systematic, easy to apply methodology that can be used to assess the threat of an oil spill and select the most appropriate protection and cleanup techniques."

80B-0888
OIL TANKER DISASTERS
Gundlach, E.R. 1977.
Environment 19(9):16-20, 25-27.

Contingency planning, Pollution control, Spill response, Metula spill, *Jacob Maersk spill

"The impact and effects of previous massive oil spills are discussed and details given of a prognosis concerning future spills and the planning necessary to combat them effectively. Case histories of previous spills are described, they include the Metula and Jacob Maersk oil spills in 1974 and 1975 respectively.

[from Aquatic Sciences and Fisheries Abstracts 8(6):155. 1978]

80B-0889
OIL, ICE AND GAS-PROCEEDINGS OF A WORKSHOP HELD IN TORONTO, CANADA, OCTOBER 10 AND 11, 1979
Mackay, D. and S. Paterson (eds.).
University of Toronto, Institute of Environmental Studies, 1979.
169p. Publication No. EE-14.

Contingency planning, Spill response, Personnel training, Ice, Behavior, Fate, Cold climates, Arctic, US, Canada, Alaska, Beaufort Sea, *Workshop

The title workshop addressed a broad range of topics relevant to oil spill fate and behavior in and under ice, US and Canadian experience in spill containment and cleanup under ice infested conditions in coastal and inland waters, and spill countermeasures and contingency planning for climate and arctic oil spills. Abstracted separately in this issue of OPA are papers by A.A. Allen, P.C. Deslauriers, D. Mackay et al., J.D. Malcom, D. McGonigal, K.M. Meikle, W.M. Pistruzak, R.S. Pritchard, E. Reimer, P.A. Tebeau et al., D.R. Topham, and G. Tsang. [see author index]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

5. Contingency Planning and Spill Response

80B-0890
COUNTERMEASURES EQUIPMENT FOR ICE-COVERED/ICE-INFESTED WATERS
Meikle, K.M. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.7-11. Publication No. EE-14.

Spill response, Equipment, Arctic, Ice, Spill containment, Spill removal, Monitoring, Canada, Beaufort Sea

The title paper discusses the Southern Beaufort Sea studies and AMOP (Arctic Marine Oilspill Program) equipment objectives and reviews oil containment/recovery equipment, oil slick igniters, and oil slick location/tracking devices.

80B-0891
A PROPOSED STUDY OF OIL AND GAS UNDER ICE
Pistruzak, W.M. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.37-46. Publication No. EE-14.

Spill response, Burning, Performance testing, Ice, Cold climates

This proposal outlines the experimental design and objectives of a field experiment which will seek to determine how successful burning would be as an oil spill clean-up countermeasure and to optimize these burning techniques.

80B-0892
PROTECTING THE MEDITERRANEAN: COORDINATING REGIONAL ACTION
Saliba, L.J. 1978.
Marine Policy 2(3):171-180.

Contingency planning, Pollution control, Mediterranean Sea

The article opens with a description of the state of pollution in the Mediterranean Sea and goes on to detail the development of regional awareness and action, examining the Action Plan for controlling pollution. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(2):229. 1979]

80B-0893
417 OIL AND HAZARDOUS MATERIALS SPILLS INVESTIGATED IN 1978
Traub, J.K. 1979.
Outdoor California 40(6):13.

Contingency planning, Spill response, Government agencies, California

The State Interagency Oil Spill Committee (SIOSC) is comprised of representatives of 13 state agencies and is responsible for coordinating activities between state agencies as well as federal agencies involved with pollution incidents. The committee developed the California State Oil Spill Contingency Plan, and has set up a state-wide toll free number to report pollution problems (800-852-7550).

80B-0894
REPORT OF THE EXECUTIVE DIRECTOR ON THE POSSIBLE ESTABLISHMENT OF SUBREGIONAL OIL COMBATING CENTRES
UNEP. 1977.
Geneva, United Nations Environment Programme, 1977. Report UNEP/1G.11/INF.8, GE 77-12182. 6p.

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:95, #4345. 1979]

80B-0895
EPA RELEASES MANUAL FOR OILSPILL RESPONSE, CLEANUP [NEWS BRIEF]
[Woodward Clyde Consultants]. 1980.
Sea Technology 21(4):68.

Spill response, Contingency planning, Spill cleanup, Manuals, Guidelines, Shorelines, Restoration, EPA

The title EPA manual was prepared by Woodward-Clyde Consultants, San Francisco, and is designed to be a decision making guide to help provide on-scene coordinators "with a systematic methodology for (1) assessing the threat of an oil spill or the extent of shoreline contamination and (2) choosing the most appropriate shoreline protection, cleanup and restoration techniques for specific shoreline types in a specific spill situation. Volume 1 is a decision guide and Volume II is an implementation guide." The manual, Report EPA 600/7-79-187a is available from the National Technical Information Service, Springfield, VA 22161.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

6. Legal and Regulatory Aspects

80B-0896
OIL POLLUTION CONTROL MECHANISMS - STATUTES AND REGULATIONS
Mississippi-Alabama Sea Grant Consortium 1978.
Report MASGP-78-014, NOAA-78062703, GRANT NOAA-04-7-158-44017. 74p.

Pollution control, Regulations, Legislation, *FWPCA

This report presents federal statutes and regulations, as well as case law, bearing on oil spill prevention and control, with consideration given to the control of oil pollution under the Federal Water Pollution Control Act (FWPCA).

[from Government Reports Announcements 78(22): 210, #PB-284 737/4GA. 1978]

7. General Prevention and Control Measures

80B-0897
AFRICAN BLOWOUT CONTAINED [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(4):68.

Blowouts, Pollution control, Africa, *Nigerian well blowout

A well five miles off Nigeria in 13-m water blew out of control in January 1980 but was brought under control the following month. "There were extremely contradictory reports on associated environmental impacts."

80B-0898
IXTOC FINALLY CAPPED [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(5):33.

Blowouts, Ixtoc I blowout, Gulf of Mexico, Mexico

The Mexican government announced in late March 1980 that the runaway Ixtoc I well blowout in the Bay of Campeche had finally been capped. Cement pumped through two relief wells reduced the oil flow to negligible amounts. Over 3 million barrels of oil were reported lost during the blowout which lasted over 10 months.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

7. General Prevention and Control Measures

80B-0899
IXTOC I STOPPED [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(5):115.

Ixtoc I blowout, Gulf of Mexico, Oil spills, Pollution control, Socioeconomic effects, Economics

The world's largest oil spill came to an end on March 21 when the Petroleos Mexicanos, Ixtoc I well was capped. The total amount of oil that was lost is estimated at 140 million gallons. PEMEX is reported to have spent $133.5 million on bringing the well under control and on various other environmental protection measures. The tourist industry along the Texas and Mexican coasts appear to be the heaviest losers from the spill.

80B-0900
OIL STATES MEET ON POLLUTION [NEWS BRIEF]
Anon. 1978.
Lloyd's List, No. 50838:2.

Pollution prevention, Pollution control, International agreements, Coastal waters, Oil transport, Conference, *Middle East

A 10-day conference was held in Kuwait on 15 April 1978 on protecting the marine environment and coastal areas of Bahrain, Iran, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates. Two treaties were considered, one to prevent pollution caused by intentional or accidental discharges from tankers and the second calls on signatories to cooperate in combatting oil pollution in cases of ship collision or oil well blowouts.

[from Aquatic Sciences and Fisheries Abstracts 8(7):147. 1978]

80B-0901
OILED BIRDS POLL [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(1):4

Birds, Spill response, Pollution control, International agreements, UK, Europe

A report by the UK Royal Society for the Protection of Birds criticizes the ineffectiveness of international law in combatting oil pollution by ships and tankers. Recommended is a joint effort by EEC countries to halt oil exploration in areas important to birds and wildlife, to increase research into the cleaning of oiled birds, and to set up a fund for cleanup of spills of unknown sources.

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL
7. General Prevention and Control Measures

80B-0902
A PLAN TO SAVE THE ARABIAN GULF [NEWS BRIEF]
Anon. 1978.
New Scientist 78(1101):279.

Pollution prevention, Coasts, Monitoring, Spill response, Pollution control, *Arabian Gulf

"Eight of the richest oil-producing states have taken the first step towards protecting the coastline of the Arabian Gulf by signing two anti-pollution treaties. A trust fund of over $6 million will be set up to fund a comprehensive 'Action Plan' to access and monitor the ecological effects of coastal engineering, mining, and the extent of oil pollution."

[from Aquatic Sciences and Fisheries 8(7):169. 1978]

80B-0903
POLLUTION CONTROL IN CANADA
Anon. 1978.
Canadian Shipping and Marine Engineering 49(4):10-17.

Pollution control, Equipment, Skimmers, Sorbents, Oil transport, Ships, Canada, IMCO, Personnel training

A variety of pollution aspects were addressed by the Environmental Protection Service of Environment Canada at IMCO meetings. Salient topics include the transport of crude and refined oils, the proper manning and operation of ships to safeguard the environment, making available Canadian pollution control technology to developing states, and discussion of disk skimmers (Morris Industries) and synthetic fiber oil sorbents (3M Brand).

[from Oceanic Abstracts 15(5):78-06638. 1978]

80B-0904
COASTAL ENVIRONMENTS OF CANADA: THE IMPACT AND CLEANUP OF OIL SPILLS
Owens, E.H. 1977.
Ottawa, Canada, Department of Fisheries and the Environment, Environmental Impact Control Directorate, 1977. Economic and Technical Review Report EPS-3-EC-77-9. 175p.

Environmental effects, Spill cleanup, Coastal waters, Coasts, Canada

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:93, #4332. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

7. General Prevention and Control Measures

80B-0905
COASTAL ENVIRONMENTS, OIL SPILLS AND CLEAN-UP PROGRAMMES IN THE BAY OF FUNDY
Owens, E.H. 1977.
Ottawa, Canada, Department of Fisheries and the Environment, Environmental Protection Service, 1977. Economic and Technical Review Report EPS-3-EC-77-9. 175p.

Spill cleanup, Spill response, Coastal waters, Coasts, Canada

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:93, #4331. 1979]

80B-0906
ACCIDENTAL MARINE POLLUTION AND ITS REMEDY [ENGLISH SUMMARY]
Pasquet, R. 1980.
Progress in Water Technology 12(1):17-34.

Spill cleanup, Spill response, Equipment, Personnel training, Contingency planning, Information systems, France

This report presents an overview of spill cleanup and response equipment, methods and materials and the limits of their effectiveness in offshore and coastal pollution accidents. Stressing the value of good contingency planning, the author advocates the establishment of information bases. Organizations with such a computerized library could make readily available global impact on characteristics and effects of products; local layout andconditions would be included. France now has such centralized support in its POLMAR groups and the the CEDRE.

80B-0907
CANADIAN COAST GUARD READY FOR THE BIG SPILL
Roach, P. 1978.
Canadian Shipping and Marine Engineering 49(4):10-12.

Pollution control, Spill response, Contingency planning, Canada, USCG

This article describes the work of the Canadian Coast Guard in the area of pollution control. Outlined is the development of and interaction among component operatives from the inception of the Marine Emergency Organization through the 1970s to the present. Landmarks in the history of Great Lakes agreements are cited.

[from Aquatic Sciences and Fisheries Abstracts 9(2):229. 1979]

7. General Prevention and Control Measures

80B-0908
CONTROLLING ARCTIC OIL SPILLS
Ross, S.L. 1980.
Spill Technology Newsletter 5(2):55-63.

Pollution control, Oil spills, Statistics, Arctic, Canada, Spill response

An analysis of the 35 largest oil spills since 1942 emphasizes the point that no two spills are alike in their environmental and economic impact. Just as no two major spills are alike in their effects, cleanup strategies must be developed that are in keeping with the different circumstances under which future spills might occur. Using the Canadian offshore environment as an example, the author outlines spill response strategies that would best work for the Beaufort Sea, the Canadian Arctic, and offshore Newfoundland.

80B-0909
BOP CONTROL ELIMINATES THE PLUMBING
[Ross Hill B.O.P. Controls]. 1978.
Offshore Services 11(2):20-21.

Blowout prevention, Product information, Equipment

"The new BOP [blowout prevention] control system developed by Ross Hill BOP Controls of Houston, Texas, eliminates much plumbing equipment,... substitutes a more reliable pump unit and accumulators,... costs no more than a conventional unit and... less time [is] needed for rigging up." The article gives a technical description of the product.

[from Oceanic Abstracts 15(5):78-6756. 1978]

80B-0910
CONTROL OF MAJOR OIL SPILLS IN THE MARINE ENVIRONMENT
Seale, M.R.M. 1978.
Hong Kong Engineer 6(7):15-21.

That which influences spilled oil such as spread, drift, evaporation, solution, dispersion, emulsification, oxidation, and biological degradation is discussed, in relation to those methods which contain and remove the contaminated materials.

[from Pollution Abstracts 10(1):48. 1979]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

7. General Prevention and Control Measures

80B-0911
PREVENTION AND CONTROL OF CHEMICAL SPILL INCIDENTS
Shields, E.J. 1980.
Pollution Engineering 12(4):52-55.

Pollution prevention, Pollution control, Spill containment

The article discusses the prevention and containment of chemical spills and a brief discussion of oil spills.

80B-0912
DRILLING WELL CONTROL
Van den Hoek, A.W.J. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29-April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:103-118.

Blowout prevention, Pollution control, Oil industry, Drilling, Platforms, Personnel training, Safety, *UNEP

"This paper describes briefly those aspects of [oil] well planning and drilling operations which form the basic ingredients for proper well control and consequently of blow-out prevention and concludes that the industry is continuously striving to optimize drilling performance."

80B-0913
THE PREVENTION OF OIL POLLUTION
Wardley-Smith, J. 1979.
New York, N.Y. John Wiley & Sons, 1979. ISBN 0-470-26718-6. 309p.

"Practical advice on how to prevent the occurrence of oil pollution from the outset is presented in this handbook through the description of oil spill prevention techniques through all phases - exploration, production, transort, refining, storage, and industrial and commercial use. The human factors and the role of law are also discussed in relation to oil pollution and its prevention."

[from Pollution Abstracts 11(2):249. 1980]

B. OIL POLLUTION PREVENTION, RESPONSE AND CONTROL

7. General Prevention and Control Measures

80B-0914
OIL POLLUTION ABATEMENT
Wisaksono, W. 1978.
Lectures Presented at the Fifth FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources. Scientific and Administrative Basis for Management Measures. Rome, FAO, 1978. p.205-216. Report ISBN 92-5-100601-6; FAO TF-RAS-34-(SWE)-Suppl-1.

Pollution control, Spill response, Pollution prevention

This paper discusses abatement, clean-up methods for oil spills, and two basic courses for action. These two are: (1) preventive action to minimize incidental pollution, and (2) repressive action should oil spills occur.

[from Aquatic Sciences and Fisheries Abstracts 9(5):149. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0915
FISH EGG CHROMOSOME DIVISIONS SENSITIVE TO CONTACT WITH OIL
Anon. 1979.
Marine Fisheries Review 41(3):27-28.

Toxicity, Argo Merchant spill, Contamination, Fish *Cod eggs

A new methodology for the study of chromosomes and their division in fish eggs is described. This method was applied to field-exposed eggs sampled near the Argo Merchant oil spill and to uncontaminated cod embryos from aquarium fish, to determine the effects of oil and tar on the chromosomes and division process. Findings indicate that damage to the zygote at the chromosome and cellular level occurs when early stage eggs are exposed.

[from Pollution Abstracts 11(2):260. 1980]

80B-0916
ON POLLUTION DETECTED IN BIRDS' EGGS [NEWS BRIEF]
Anon. 1977.
Pollution Bulletin 8(8):173.

Biological effects, Birds, Growth, Development, *Egg hatchability

Experiments were conducted on Japanese Quail, chickens, and Canadian Geese, who after being fed 200 mg of oil produced eggs the following four days which had grossly abnormal yolks as well as decreased numbers and hatchability. Although results show that after four days both the birds and their eggs returned to normal.

[from Aquatic Sciences and Fisheries Abstracts 8(3):112. 1978]

80B-0917
POLAR BEAR DEATHS FROM OIL [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(5):117-118.

Biological effects, Mammals, Arctic, Mortality, Canada, *Polar bears

An experiment conducted in Manitoba, which was designed to test the effect of oil spills on large Arctic mammals to help determine future regulations relating to Arctic oil exploration resulted in the death of two polar bears.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0918
BIOTRANSFORMATION OF BENZO(A)PYRENE BY LITTLE SKATE HEPATIC MICROSOMES - STIMULATION AND RECONSTITUTION OF BENZO(A)PYRENE HYDROXYLASE ACTIVITY
Arinc, E., R.J. Pohl, J.R. Bend, R.M. Philpot. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p. 273-276.

Toxicity, Metabolism, PAH, Invertebrates, *Little skate

Polycyclic aromatic hydrocarbons (PAH) occur in many environments, including oil spills and oil-contaminated water. The carcinogenicity of PAHs, such as benzo(a)pyrene, in experimental animals is affected by the animal's metabolism. This paper describes stimulation and reconstitution of benzopyrene hydroxylase activity of skate liver microsomes.

80B-0919
ON THE ADAPTATION OF THE BLUE-GREEN ALGA *SYNECHOCYSTIS AQUATILIS* TO OIL AND OIL PRODUCTS [ENGLISH SUMMARY]
Artyukhova, V.I. and L.D. Gapochka. 1978.
Vestnik Moskovskogo Universiteta, Seriya 16, Biologiya, No.1:13-18.

Petroleum products, Fuel oil, Toxicity, Concentrations, Mortality, Algae, **Synechocystis aquatilis*

"Experiments performed to study the adaptation of *S. aquatilis* to sublethal and lethal concentrations of two different kinds of oil and a motor fuel showed the alga to be capable of adaptation to toxic and lethal concentrations."

[from Aquatic Sciences and Fisheries Abstracts 8(8):184. 1978]

80B-0920
NEW PROCEDURES FOR THE TOXICITY TESTING OF OIL SLICK DISPERSANTS IN THE UNITED KINGDOM
Blackman, R.A.A., F.L. Franklin, M.G. Norton, and K.W. Wilson. 1978.
Marine Pollution Bulletin 9(9):234-238.

Toxicity, Dispersants, Beaches, Seawater, Performance testing, UK

Spurred by the licensing requirements of the Dumping at Sea Act (1974), the development rationale of two toxicity tests - the Sea Test and the Beach Text - are herein described. Test methods and results are included.

[from Aquatic Sciences and Fisheries Abstracts 9(6):142. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0921
PLANT GROWTH INHIBITION BY THE WATER EXTRACT OF A CRUDE OIL
Blankenship, D.W. and R.A. Larson. 1978.
Water, Air, and Soil Pollution 10(4):471-476.

Crude oil, WSF, Plants, Development, *Growth inhibition

Spills of petroleum oils are known to inhibit plant growth. "The water extract of a light Nigerian crude oil had pronounced effects on the growth, metabolism and development of radish plants. In addition to hydrocarbons the extract contained phenols, carbonyl compounds, and carboxylic acids."

80B-0922
MARINE ORGANISMS AS INDICATORS OF POLLUTION OF THE SEA BY OIL [IN ENGLISH]
Boler, J.B. and F. Oreld. 1978.
Norsk Oljerevy 4(3):34-37.

Marine organisms, Bioindicators, Contamination, North Sea

Summary not available.

[from Aquatic Sciences and Fisheries Abstracts 9(6):142. 1979]

80B-0923
IMPACT OF AMOCO CADIZ OIL SPILL ON INTERTIDAL AND SUBLITTORAL MEIOFAUNA
Boucher, G. 1980.
Marine Pollution Bulletin 11(4):95-101.

Amoco Cadiz spill, Biological effects, Intertidal zone, Detection, Invertebrates, *Nematodes, *Copepods

Changes of meiofauna densities (nematodes and harpacticoid copepods) were studied in sand heavily polluted by the Amoco Cadiz spill. "A general decrease in the nematode abundance was obvious in intertidal sand seven months after the pollution in spite of the occurrence of the natural spring bloom. No changes in the nematode and copepod densites could be detected in sublittoral sand. Comparisons with the pre-pollution data show, however, a significant decrease in the nematode diversity, mainly due to the increase of some limited dominant species after pollution."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0924
OIL INHIBITS REPRODUCTION IN TESTS ON MUSSELS
Cooley, J.F. 1977.
Maritimes 21(4):12-14.

Mollusks, Biological effects, Reproduction, Mortality, Chronic effects, Sublethal effects

In experiments conducted on the blue mussel Mytilus edulis and the common starfish Asterias forbesi, the effects of No. 2 home heating oil on physiology and reproduction were assessed. Oil in water influenced respiration, feeding, response time, reproduction and byssal thread production in mussels. Increased mortality aside, these effects are enough to cause the species to die out over time. Starfish showed no direct response, but secondary long-term effects through predation on filter-feeders may exist.

[from Aquatic Sciences and Fisheries Abstracts 9(2):220. 1979]

80B-0925
BIOLOGICAL EFFECTS OF MARINE POLLUTION BY OILS [IN FRENCH]
Dandonneau, Y. 1978.
Peche Maritime, No. 1203:343-345.

Chronic effects, Acute effects, Marine organisms

The author distinguishes two types of title pollution - accidental and chronic - and categorizes effects as immediate, short term and long term. Effects of pollution on marine biota are discussed.

[from Aquatic Sciences and Fisheries Abstracts 9(4):194. 1979]

80B-0926
CHANGES IN BIOCHEMICAL INDEXES OF SOME COASTAL HYDROBIONTS OF THE BARENTS SEA DURING EXPERIMENTAL OIL INTOXICATION
Divavin, I.A. and V.E. Erokhin. 1978.
Gidrobiologicheskii Zhurnal 14(5):73-77.

Toxicity, Invertebrates, Algae, Coastal waters, Barents Sea

"The changes in the amount of protein, free nucleotides, and nucleic acids of 3 species of brown algae and 4 species of invertebrates were examined after intoxification with 0.1 mL/L oil at 7.5°-10°C." With all invertebrates, the changes in nucleotide number related directly to changes in DNA and RNA, except for one occurence of an inverse relationship.

[from Pollution Abstracts 11(1):33. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0927
THE EFFECT OF DETERGENT "SOLO" AND CRUDE OIL ON THE ACTIVITIES OF CATHEPSIN D AND ACID PHOSPHATASE IN HEMOLYMPH OF CRANGON CRANGON L. [IN ENGLISH]
Drewa, G., Z. Zbytniewski, and F. Pautsch. 1977.
Polskie Archiwum Hydrobiologii 24(2):279-284.

Dispersant, Crude oil, Crustaceans, Biological effects, *Acid phosphatase activity, *Cathepsin D activity, *Crangon crangon L.

The title experiment was carried out on shrimp bred during 72h in solutions of the detergent and the oil at concentrations of 10, 50 and 100 mg/l. Acid phosphatase activity in all instances was reduced after 12h, while cathepsin D activity escalated. After 72h enzyme activity returned to control levels. "It is assumed that the detergent and crude oil cause a change in the permeability of the lysosomal membranes."

[from Aquatic Sciences and Fisheries Abstracts 9(1):228. 1979]

80B-0928
CONVOLUTA ROSCOFFENSIS AND THE AMOCO CADIZ OIL SPILL
Gooday, G.W. 1980.
Marine Pollution Bulletin 11(4):101-103.

Amoco Cadiz spill, Marine organisms, Invertebrates, *Convoluta roscoffensis

This report represents results of a comparison of the symbiotic flatworm Convoluta roscoffensis on the beach at Dune de Ste. Marguerite, located 7 km due east of the Amoco Cadiz spill, between July 1976 and July 1978. Seven of the nine sites recorded in 1976 had colonies of worms. The colonies were found to be fewer and smaller, but densities within colonies were unchanged.

80B-0929
EFFECTS OF CRUDE OIL ON SOIL RESPIRATION IN ARCTIC TUNDRA SOILS
Gustin. P. and R.M. Atlas. 1978.
American Society for Microbiology, 78th Annual Meeting, Las Vegas, Nevada, 1978. R. Slepecky (ed.). Washington, DC, American Society for Microbiology, 1978. p.207. Abstract No. Q73.

Crude oil, Chemical effects, Soil, Arctic, *Tundra, *Soil respiration

In situ application of 5 and 12 L/m^2 Prudhoe crude oil to 4 types of tundra soils resulted in changes in soil respiration. For two years after treatment, the respiratory quotients (RQ) were lower in the treated than in the untreated soils, except in poorly drained soils, in which RQ values were higher in oiled than reference soils.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0930
EMBRYOTOXIC EFFECTS OF CRUDE OIL IN MALLARD DUCKS AND CHICKS
Hoffman, D.J. 1978.
Toxicology and Applied Pharmacology 46(1):183-190.

Toxicity, Crude oil, Fuel oil, Birds, *Mallard ducks, *Embryotoxicity

Studies have revealed that surface applications of microliter amounts of some crude and fuel oils that coat less than 10 percent of the egg surface reduce hatching considerably. External application of paraffin compounds present in crude oil had no embryotoxic effects, suggesting that other components including aromatic hydrocarbons and organometallics may cause embryotoxicity.

80B-0931
ONSHORE SURVEY OF MACROBENTHOS ALONG THE BRITTANY COAST FOLLOWING THE *AMOCO CADIZ* OIL SPILL
Hyland, J.L. 1978.
Amoco Cadiz. Preliminary observations of the Oil Spill Impact on the Marine Environment. One Day Session *Amoco Cadiz*, Brest, France. June 7, 1978. G. Conan, L. D'Ozouville and M. Marchand (eds.). Brest, CNEXO/COB, 1978. p.175-192.

Amoco Cadiz spill, Onshore, Sampling, Coasts, Intertidal zone, Benthos, Ecosystems, France

"A preliminary ecological survey was conducted along the northern Brittany coast for the purpose of evaluating the initial impact of the *Amoco Cadiz* oil spill on intertidal macrofaunal communities. Specific objectives were to observe obviously oiled, dead or moribund organisms on contaminated beaches, and to conduct a limited examination of the structure and composition of benthic communities considered at risk to impact. Results reflecting these objectives are discussed for a variety of habitats."

[from Aquatic Sciences and Fisheries Abstracts 9(4):187. 1979]

80B-0932
EFFECTS OF OIL TRANSFERRED FROM INCUBATING GULLS TO THEIR EGGS
King, K.A. and C.A. Lefever. 1979.
Marine Pollution Bulletin 10(11):319-321.

Birds, Biological effects, Mortality, Fuel oil, *Incubating gulls

"No. 2 fuel oil, or water, was applied to the breast feathers of incubating laughing gulls trapped at their nest site on an island colony in Texas. Gulls were released after treatment and allowed to incubate their eggs for 5 days. Oil was transferred from the feathers of incubating adults to their eggs and resulted in 41% embryo mortality compared with 2% in controls."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0933
ABNORMAL DEVELOPMENT OF DENTALIUM DUE TO THE AMOCO CADIZ OIL SPILL
Koster, A.S.J. and J.A.M. Van Den Biggelaar. 1980.
Marine Pollution Bulletin 11(6):166-169.

Amoco Cadiz spill, Biological effects, Development, Growth, Mollusks, *Dentalium eggs

"A comparison was made between the development of Dentalium eggs, spawned by animals, collected before and after the Amoco Cadiz oil spill." Development of eggs from animals collected before the oil spill was significantly better than those collected after the spill. It is suggested that development is affected by oil hydrocarbons, accumulated during oogenesis in the lipid-rich phases of the oocytes.

80B-0934
NOXIOUS EFFECTS OF DIESEL OIL D-2 AND THE SYNERGISTIC EFFECT OF POLYCHLORINATED BIPHENYLS (AROCLOR 1242) ON ZOOPLANKTON SPECIES EURYDICE TRUNCATA
Krsinic, F, D. Vilicic, M. Picer and N. Picer. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.307-312.

Toxicity, Fuel oil, Emulsions, Concentrations, Zooplankton, Mortality, *Diesel oil, *Eurydice truncata

In the title experiments, Diesel oil D-2 was added in emulsion form at concentrations of 0.01, 0.1, 0.5, 1, 5, and 10 ppm. Aroclor was always added in a concentration of 0.2 ppb. "In a concentration of 10 ppm Diesel oil in the course of 48 hours the mortality was rather high in all tested organisms, while in concentration less than 1 ppm no mortality effects were registered even after the addition of Aroclor 1242."

80B-0935
EFFECTS OF CRUDE OIL AND AROMATIC HYDROCARBONS ON THE PHOTOSYNTHESIS OF THE DIATOM NITZSCHIA PALEA
Kusk, K.O. 1978.
Physiologia Plantarum 43(1):1-6.

Biological effects, Plants, Crude oil, Concentrations, *Photosynthesis, *Nitzschia palea

"The rate of light saturated photosynthesis of N. palea was reduced by crude oil, naphthalene, and benzene. The effects on photosynthesis were generally found to be reversible, but a concentration of 700 mg benzene/l stopped photosynthesis completely and irreversibly."

[from Aquatic Sciences and Fisheries Abstracts 8(12):154. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0936

EXPERIMENTAL STUDY OF THE INFLUENCE OF PETROLEUM PRODUCTS ON PRIMARY PRODUCTION IN THE MARINE ENVIRONMENT [IN FRENCH]
Lacaze, J.C. 1978.
Paris-6 University [sic], Ph.D. Dissertation. 496p.

Biological effects, Petroleum products, Marine organisms, Microorganisms, Marine Environment

The effects of crude oil on microalgae were assessed experimentally. Time of exposure was an important factor, toxicity decreased with length of exposure. Toxicity was 2 to 3 times greater when emulsions were made under light, whereas temperature effects were insignificant.

[from Aquatic Sciences and Fisheries Abstracts 9(4):186. 1979]

80B-0937

NET-AND NANOPLANTON: EFFECTS OF AN OIL SPILL IN THE NORTH SEA
Laennergren, C. 1978.
Botanica Marina 21(6):353-356.

North Sea, Biological effects, Plankton, Contamination

"No harmful effects were detected; on the contrary, the largest biomass and production occurred in the most contaminated water, containing about 260 ppb of petroleum hydrocarbons."

80B-0938

CHRONIC SUBLETHAL EFFECTS OF WATER SOLUBLE FRACTIONS OF NO. 2 FUEL OILS ON THE MARINE ISOPOD, SPHAEROMA QUADRIDENTATUM
Lee, W.Y. 1978.
Marine Environmental Research 1(1):5-17.

Chronic effects, Mortality, Sublethal effects, WSF, Fuel Oil

In the first of two experiments, juvenile isopods were exposed to sublethal concentrations of fuel oil at room temperatures for nine months. Though surviving to reproduce, growth rate and fecundity were adversely affected. Offspring from groups exposed to ≥ 1% WSF experienced high mortality. In the other experiment, adult Sphaeroma were subjected to the WSFs of four fuel oils for one month. Fecundity was uniformly depressed, regardless of oil type.

80B-0939

INFLUENCE OF WEATHERED CRUDE OIL ON LIVER ENZYME METABOLISM OF TESTOSTERONE IN GULLS
McEwan, E.H. and P.M. Whitehead. 1978.
Canadian Journal of Zoology 56(9):1922-1924.

Crude oil, Weathering, Metabolism, Birds, *Testosterone, *Gulls

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

"Experiments were conducted with glaucose-winged gulls, *Larus glaucescens*, to evaluate the effect of petroleum hydrocarbons on testosterone metabolism by liver enzymes, using an assay which measured the metabolism of [4-^{14}C] testosterone. Diets containing 100 and 500 mg of weathered crude oil per day had no significant effect on testosterone metabolism."

[from Aquatic Sciences and Fisheries Abstracts 9(5):144. 1979]

80B-0940
THE ASSESSMENT OF SUBLETHAL EFFECTS OF POLLUTANTS IN THE SEA [BOOK REVIEW]
Mann, K.H. 1980.
Limnology and Oceanography 25(3):577-578.

Detection, Sublethal effects, Toxicity, Wastewaters, Contamination, Fish, Ecosystems

The title book [H.A. Cole (organizer). London, The Royal Society, 1979. Viii + 230p. Reprint of Philosophical Transactions of the Royal Society, Series B 286 (1015)] presents papers from a recent Royal Society Discussion Meeting. The papers "represent a serious attempt to grapple the elusive questions raised by sublethal effects of pollutants in the Sea". Detection of pollutants, and effluent effects on fish and ecosystems are among topics covered. [possibly oil pollution related]

80B-0941
CHRONIC EFFECTS OF THREE CRUDE OILS ON OYSTERS SUSPENDED IN ESTUARINE PONDS
Minchew, C.D. 1978.
Journal of Environmental Pathology and Toxicology 1(6):879-895.

Chronic effects, Crude oil, Mollusks, Estuaries, *Oysters

"Gross and histological observations obtained from the study of oysters chronically exposed to single, 4 ppm quantities of Empire Mix, Saudi Arabian, and Nigerian crude oils in estuarine ponds indicate a reduced intake and assimilation of food by oysters *Crassostrea virginica*." The tissues of many of the test animals were clear, watery, and emaciated in appearance. The muscle and connective tissue fibers were swollen, translucent, homogenous, structureless masses.

[from Pollution Abstracts 10(4):655-656. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0942
EFFECTS OF AROMATIC HYDROCARBONS ON MARINE ORGANISMS. A BRIEF REVIEW ON RECENT STUDIES OF NAPHTHALENES
Mohri, T. 1979.
Aromatikkusu 31(1/2):11-16.

Aromatic hydrocarbons, Biological effects, Marine organisms, *Naphthalenes

"A review with 5 references".

[from Chemical Abstracts 91(5): #69,305z. 1979]

80B-0943
EFFECT OF *AMOCO CADIZ* OIL ON SEA BIRDS. PRELIMINARY CONCLUSIONS [ENGLISH SUMMARY]
Monnat, J.Y. 1978.
Amoco Cadiz. Preliminary Observations of the Oil Spill Impact on the Marine Environment. One Day Session *Amoco Cadiz*, Brest, France. June 7, 1978. G. Conan, L. D'Ozouville, and M. Marchand (eds.). Brest, CNEXO/COB, 1978. p.135-142.

Amoco Cadiz spill, Birds, Mortality

Sea bird mortality was observed after the title oil spill. "The number of dead birds is estimated between 15,000 and 20,000. Forty-one species were affected and of these, four species represent 85% of killed birds: puffins, small auks, troil guillemots, green cormorants. The mortality is 0.1 bird by tonne of spilt oil; the *Amoco Cadiz* seems to have provoked an unusual reaction."

[from Aquatic Sciences and Fisheries Abstracts 9(4):187. 1979]

80B-0944
POLYCYCLIC HYDROCARBONS AND CANCER [BOOK REVIEW]
Mower, H.F. 1979.
Water, Air and Soil Pollution 12(4):536-537.

Health hazards, Carcinogens, PAH, Microorganisms, Mammals, Book review

The title book has two volumes [H.V.V. Gelbain and P.O.P. Ts'o. (eds.). New York, Academic Press, 1979. 860p]. These volumes summarize new knowledge of the polycyclic aromatic hydrocarbons (PAH) and their role as enviornmental carcinogenic agents. In the first volume, PAH contents of energy sources, including petroleum and oil shale are discussed in terms of their sources, occurrence, monitoring methods, chemistry, and carcinogenic activity. Volume II deals with PAH interactions with DNA and chromatin, microbial and mammalian mutagenesis, genetics and numerous other topics [possibly oil pollution related].

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0945
ACUTE AND SUBLETHAL TOXICITY OF NAPHTHALENE AND THREE METHYLATED DERIVATIVES TO THE ESTUARINE COPEPOD, EURYTEMORA AFFINIS
Ott, F.S., R.P. Harris and S.C.M. O'Hara. 1978.
Marine Enviornmental Research 1(1):49-58.

Toxicity, Sublethal effects, Estuaries, Contamination, *Copepods, *Naphthalene

"The bi-cyclic aromatic hydrocarbon naphthalene (N) and its alkylated derivatives 2-methylnaphthalene (MN), 2,6-dimenthylnaphthalene (DMN) and 2,3,5-trimethylnaphthalene (TMN) were used to investigate possible relationships between increased methylation and toxicity during acute high level and chronic low level exposure experiments using the title copepod. Results are related to previous work on the fate and effect of petroleum hydrocarbons in marine copepods."

[from Aquatic Sciences and Fisheries Abstracts 9(3):166. 1979]

80B-0946
EFFECTS OF INGESTED CRUDE OIL ON BLACK GUILLEMOTS: A COMBINED FIELD AND LABORATORY STUDY
Peakall, D.B., D. Hallet, D.S. Miller, R.G. Butler and W.B. Kinler. 1980.
Ambio 9(1):28-30.

Crude oil, Birds, Toxicity, Growth, Habitats

The title study was performed to test the physiological effects of pollutants on black guillemots during their nestling stage. It was found that the crude oil affected body weight and could cause serious sublethal toxic effects for the adult black guillemots as well as for their habitats.

80B-0947
BIOACCUMULATION POTENTIAL OF POLYCYCLIC AROMATIC HYDROCARBONS IN DAPHNIA PULEX
Southworth, G.R., J.J. Beauchamp and P.K. Schmieder. 1978.
Water Research 12(11):973-977.

Uptake, PAH, Crustaceans, *Daphnia pulex

Seven PAHs were tested using D. pulex: naphthalene, anthracene, phenanthrene, pyrene, 9-methylanthracene, benz(a)anthracene and perylene. "Estimations of equilibrium concentration factors obtained by... the two methods were in good agreement, and increased dramatically with increasing molecular weight within the series of compounds. The calculated n-octanol-water partition coefficient was shown to be a good predictor" of the title parameter. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(5)146. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

1. Biological Aspects

80B-0948
THE HIGH PRICE OF OIL
Stowe, T. 1978.
Nautical Review 2(3):18-19.

Birds, UK, *Vulnerability, *Auks

The susceptibility of birds to oil pollution is discussed. The birds most at risk are the auk group of which the three most common in Britain are the razor-bill, the guillemot, and the puffin, with Seaducks, Divers, and Grebes being the second group of highly vulnerable species.

[from Aquatic Sciences and Fisheries Abstracts 8(10):121. 1978]

80B-0949
FUNDAMENTAL STUDIES ON THE INFLUENCE OF OIL POLLUTION UPON MARINE ORGANISMS - V. THE TOXICITY OF THE GELLING COMPOUNDS FOR PETROLELUM TO MARINE ORGANISMS [ENGLISH SUMMARY]
Tokuda, H. 1979.
Bulletin of the Japanese Society of Scientific Fisheries 45(11):1385-1387.

Toxicity, Marine organisms, Fish, *Diatoms, *Gelling compounds

The toxicity of two components of compounds for gelling petroleum were analyzed for the marine diatom, Skeletonema costatum and a rice fish, Oryzias latipes.

80B-0950
ACTIVITY-DIRECTED FRACTIONATION OF PETROLEUM
Warner, J.S. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.149-155. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Biological effects, Toxicity, Mutagens, Weathering, Hydrocarbons

The title research program, in its formative stage, is designed to assess potential biological activity of petroleum components which are generally ignored - nonvolatile and polar. Since long-term effects of a spill involve persistent elements in weathered petroleum, analysis of thbse components is deemed necessary.

[from Aquatic Sciences and Fisheries Abstracts 9(4):179. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

2. Physical and Chemical Aspects

80B-0951

QUANTITATIVE EVALUATION OF CERTAIN CHEMICAL-BIOLOGICAL CONSEQUENCES OF SEA POLLUTION BY OIL PRODUCTS AND DETERGENTS

Bronfman, A.M. and A.B. Gorstko. 1978.
Soviet Journal of Ecology 9(2):150-153.

Petroleum products, Surfactants, Benthos, Marine organisms, Mollusks

"Chemical pollution by oil products and detergents and their consequences to the pelagic and benthic regions of the sea are examined. The study indicated that each increase in the content of oil products or detergents in the bottom water layers of 0.1 mg/L decreased the O_2 concentration in the latter by an average of 0.06 and 0.66 mL/L, respectively." An increase in the amount of oil products of only 1 mg/g of surface layer of the deposit reduces the average weight of the mollusk *Cardium lamarcki* by 15% of the mean weight of the given group value.

80B-0952

COASTAL METEOROLOGY OF THE ALASKAN ARCTIC COAST

Carsey, F. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 15. Transport Report NOAA/ERL-AR-77-15. p.538-578.

Sea surface, Coasts, Spill trajectories, Drift, Movement, Arctic, Alaska, Ice, *Currents, *Meteorology

This study examines the winds which produce significant surface currents and tides in the Prudhoe Bay area. This information taken with other current-producing mechanisms describes the mean trajectory and lateral diffusion of oil on open water, and, to a certain extent, oil under sea ice.

[from Aquatic Sciences and Fisheries Abstracts 8(9):144-145. 1978]

80B-0953

SUNLIGHT GLITTER ON A WIND-RUFFLED SEA: FURTHER STUDIES

Guinn, J.A., G.N. Plass and G.W. Kattawar. 1979.
Applied Optics 18(6)842-849.

Oil slicks, Physical aspects, Behavior, *Sunlight glitter

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1018858. 1980]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

2. Physical and Chemical Aspects

80B-0954

THE CHARACTERIZATION OF THE PROPERTIES OF SEA SEDIMENTS IN MARINE POLLUTION RESEARCH

Juracic, M. and V. Pravdic. 1979.

Workshop on Pollution of the Mediterranean, Antalya, Turkey 24-27 November 1978. Monaco, CIESM, 1979. p.629-634.

Sediments, Physical aspects, Adsorption, Hydrocarbons, Tar, *Autopurification

This report describes characterization of sediments in terms of their particle size, mineral composition, surface area, and adsorption energies for some pollutants, including petroleum hydrocarbons. "Results... indicate that sediments will never be a final repository for petroleum hydrocarbons.... Regions with a stronger impact of terrigenous suspended silicate material will, apparently shown an increased ability for auto-purification by absorptive removal of petroleum hydrocarbons."

80B-0955

A STUDY OF SOME PHYSICO-CHEMICAL CHARACTERISTICS OF MUCUS IN THE BLACK SEA PICAREL UNDER CONDITIONS OF PETROLEUM TOXICOSIS [IN RUSSIAN]

Korolev, A.M., O.Yu. Frolov and N.D. Mazmanidi. 1978.

Biologicheskie Nauki, No. 9:38-45.

Physical effects, Chemical effects, Toxicity, WSF, Black Sea, *Picarel

The title study examines the effect of different concentrations of water-soluble petroleum fractions on mucus from the olfactory pit and cutaneous coverings of Spicara smaris. Changes in total protein content, protein fraction ratios, isoenzyme composition and peroxidase activity are reported.

[from Aquatic Sciences and Fisheries Abstracts 9(5):66. 1979]

80B-0956

SURFACE DISPLACEMENT BY U.S. COAST GUARD 82-FOOT CUTTERS

Kraus, S.P., R.W. Tennant and C. Hansen. 1979.

U.S. Coast Guard Report CG-D-34-79. 88p. NTIS Report AD-A077664.

Ships, Physical aspects, Sea surface, Oil slicks, USN, USCG, Spill response

"The U.S. Navy in cooperation with the U.S. Coast Guard, is conducting design and feasibility studies for a portable oil sorbent spreader and retriever for use aboard military and commercial vessels-of-opportunity during oil spill cleanup operations." As part of this research, sea tests were conducted to determine the effects of vessels on surface oil slicks. This report describes the data collection program associated with the sea tests and results of the authors' analysis of field data.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION
2. Physical and Chemical Aspects

80B-0957
THE SEASONAL VARIATION OF OIL ENTRAINMENT IN FIRST YEAR ARCTIC SEA ICE: A COMPARISON OF NORCOR/OCS OBSERVATIONS
Martin, S. 1977.
Department of Oceanography Special Report No. 71. __p. (Report from BLM/NOAA Contract No. 03-5-022-67, Task order No. 6, Research Unit No. 87.).

Arctic, Ice, BLM, NOAA, Sea surface, *Oil entrainment, *Seasonal variations, *NORCOR/OCS

Summary not available.

[from Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.5.31.]

80B-0958
THE ENTRAINMENT OF OIL FROM AN OIL SLICK INTO THE WATER COLUMN
Persen, L.N. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.1.41-1.61.

Behavior, Fate, Dispersions, Oil slicks, *Oil, Entrainment, *Water column

The question of how the entrainment of oil into the water column from a surface oil slick takes place is a crucial one in studying the fate of an oil spill and finding the best spill response method. "It is the purpose of this presentation to advance a few ideas on the entrainment process, to comment on some of the possible parameters of the problem and to go on to a description of some experiments initiated..."

80B-0959
INVESTIGATION OF SOME PHYSICO-CHEMICAL ASPECTS OF DISTRIBUTION OF POLLUTANTS AT THE SEA WATER/AIR AND SEA WATER/SEDIMENT INTERFACE
Pravdic, V., M. Juracic and D. Dragcevic. 1979.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.611-615.

Distribution, Adsorption, Contamination, Physical aspects, Oil slicks, Tar, Sediments, Sea surface, Mediterranean Sea

"Sediment samples were analyzed on their surface properties considering them as the probably, ultimate depository for major pollutants. The energetics of adsorption of petroleum hydrocarbons on these interfaces [are] reported here."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

2. Physical and Chemical Aspects

80B-0960
THEORETICAL STUDY TO DETERMINE THE SEA STATE LIMIT FOR THE SURVIVAL OF OIL SLICKS ON THE OCEAN
Raj, P.P.K. 1978.
Report USCG-D-90-77, Contract DOT-CG-61505-A. 77p.

Behavior, Dispersion, Oil slicks, Physical effects, *Sea state

This report has derived models for determining the conditions under which breaking waves will disperse an oil slick. Several important unknown physical parameters are identified and recommendations are made for their experimental determination.

[from Government Reports Announcement 78(9):177. 1978]

80B-0961
IMAGE ANALYSIS OF OIL POLLUTION
Sakata, T. and H. Shimoda. 1977.
Tokyo Symposium '77 on Photo and Electroimaging, Tokyo, 26-30 September, 1977, p. 42.1-42.6.

Physical aspects, Analytical techniques, Oil slicks

Summary not available.

[from RESORS, Canada Centre for Remote Sensing Database: #1017341. 1980]

3. Social and Economic Aspects

80B-0962
ECOLOGICAL DAMAGE ASSESSMENT SEEN QUESTIONABLE AT BEST [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(1):55.

Ecosystems, Environmental effects, Oil spills, Compensation, Socioeconomic effects, Economics

Biologists G. Cox and J. Lindstedt-Siva argue that measuring ecological damage from oil spills is almost impossible, and awarding monetary compensation for ecological damages makes little sense. "Money might be spent better if it were used to develop methods to mitigate damage rather than only study the damage."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

3. Social and Economic Aspects

80B-0963
NATURAL OIL SEEPS AND WESSON OIL-A CRUDE COMPARISON [news brief]
Ehrenspeck, H., T. Matuck, and K. Judson. 1980.
California Hedonists, First and Final Issue:1.

Natural seepage, Crude oil, Lubricating oil, Recycling, Santa Barbara Channel, California, *Wesson oil, *Sensuality index

At a recent Santa Barbara, California, Wesson oil party, crude oil from nearby offshore seeps was evaluated as a possible free and abundant substitute for the real thing. Although the crude oil exhibited superior lubricity, its stench and persistent staining properties left it ranking low on the sensuality index. Besides, the Wesson oil could be recycled as salad oil after the party. [not possibly oil pollution related]

80B-0964
TOURISM AND ENVIRONMENTAL QUALITY: TWO APPROACHES FOR AN ESTIMATION OF THE SOCIAL COST OF THE AMOCO CADIZ WRECK IN BRITTANY [IN FRENCH]
Brest University. 1978.
Brest (France), Brest University, 1978. 95p.

Amoco Cadiz spill, Socioeconomic effects, Coasts, Beaches, *Tourism, France

The theoretical findings of the social cost of pollution (from the tourist's point of view) are described. Two approaches to an evaluation are suggested: an estimation of variations by direct enquiries, and the "hedonistic" approach. The enquiry form made by the University is presented.

[from Aquatic Sciences and Fisheries Abstracts 9(6):140. 1979]

4. Environmental Response and Recovery

80B-0965
AN ATTEMPT TO RESCUE OILED SEA-BIRDS [IN FRENCH]
Grandpierre, J. F. Leboulenger and F. Leuge. 1977.
Courrier de la Nature, Homme et L'Oiseau, No. 49:117-129.

Birds, Restoration, *Seabird rescue

Procedures are outlines for treatment of oiled sea birds, including immediate care, feeding, cleaning and readaptation to aquatic life.

[from Aquatic Sciences and Fisheries Abstracts 9(4):181. 1979]

4. Environmental Response and Recovery

80B-0966
SEPARATING OIL FROM SEA BIRDS: GIVING WITNESS OR SAVING LIVES
Smail, J. 1978.
Oceans 11(4):59-61.

Restoration, Birds, Mortality, UK

An overview of the state of the art of oiled bird rehabilitation, the article concentrates on British research and general disagreement on the selection and proper use of solvents. Simple commercial detergents are preferable to mineral oils, and improved techniques have yielded moderately successful results. The impact of mortality on world bird populations is detectable, and in some areas, of epidemic proportions: future prospects are not bright.

[from Aquatic Sciences and Fisheries Abstracts 9(5):146. 1979]

80B-0967
THE SELF-CLEANING PROCESS AND THE BIOLOGICAL RECOVERY: THE CHEDABUCTO BAY SPILL - ARROW 1970
Vandermeulen, J.H. 1977.
Oceanus 20(4):31-39.

Recovery, Restoration, Biological effects, Bays, Estuaries, Sediments, Canada, *Chedabucto Bay spill

Of the 2.5 million gallons of crude oil spilled, an estimated 450,000 gallons came ashore. By 1973, 75% of the heavily oiled shoreline was cleansed and less than 5% is now visibly oiled. A detailed study concerned with hydrocarbons still resident in sediments, wave action in the self-cleaning process, and the biological implications, long- and short-term are discussed.

[from Aquatic Sciences and Fisheries Abstracts 8(9):150. 1978]

5. Baseline and Environmental Impact Studies

80B-0968
ASSESSMENT OF POTENTIAL INTERACTIONS OF MICROORGANISMS AND POLLUTANTS RESULTING FROM PETROLEUM DEVELOPMENT ON THE OUTER CONTINENTAL SHELF IN THE BEAUFORT SEA
Atlas, R.M. and T. Kaneko. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume II. Receptors-Microbiology. Report NOAA/ERL-AR-77-11, No. 03-5-022-85. p.1-157.

Baseline studies, Hydrocarbons, Microorganisms, OCS, Beaufort Sea, Biodegradation

"The objectives of this project were to characterize microbial communities in the Beaufort Sea and to determine the ability of the indigenous microbial community to biodegrade petroleum hydrocarbons."

[from Aquatic Sciences and Fisheries Abstracts 8(9):16. 1978]

80B-0969
ASSESSMENT OF POTENTIAL INTERACTIONS OF MICROORGANISMS AND POLLUTANTS RESULTING FROM PETROLEUM DEVELOPMENT ON THE OUTER CONTINENTAL SHELF IN THE GULF OF ALASKA AND COOK INLET
Atlas, R.M. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume II. Receptors-Microbiology. Report NOAA/ERL-AR-77-11, No.03-6-022-35109. p.158-221.

Microorganisms, Baseline studies, Biodegradation, OCS, Alaska

The objectives of this project were to characterize microbial communities and analyze their hydrocarbon biodegradation potentials.

[from Aquatic and Sciences and Fisheries Abstracts 8(9):16. 1978]

80B-0970
CHEMISTRY AND MICROBIOLOGY
Atlas, R.M. (ed.). 1978.
Environmental Assessment of the Alaskan Continental Shelf. Interim Synthesis Report: Beaufort/Chukcki. Part 1: Disciplinary overviews and Identification of Information Gaps. Boulder, US Environmental Research Laboratories, 1978. p.238-249.

Baseline studies, Ecosystems, Chemical effects, Microorganisms, Food web, OCS, Development, Alaska

Surveyed in the report is a wide variety of topics related to the Beaufort Sea ecosystem. The effects of petroleum development will depend largely on food chain or path of energy flow, which must be quantified. Consideration is also given to the ambient concentration of metals. Due to the scope of the project, many "data gaps" are acknowledged.

[from Aquatic Sciences and Fisheries Abstracts 9(6):7. 1979]

80B-0971
POTENTIAL PACIFIC COAST OIL PORTS: A COMPARATIVE ENVIRONMENTAL RISK ANALYSIS. VOLUME 1 AND VOLUME 2. SUPPLEMENTARY APPENDICES.
Fisheries and Environment Canada. Working Group on West Coast Deepwater Oil Port. 1978.
Vancouver , B.C., Fisheries and Environment Canada, Working Group on West Coast Deepwater Oil Ports, 1978. V.1:125p.; V.2:summary and appendices.

EIS, Risk analysis, Economics, Socioeconomic effects, Ports, Spill response, Washington, Canada, Pacific Coast

Rating a variety of factors, indices of Biological Risk, Economic Risk and Social Risk are compared "port/route to port/route by several ranking methods to determine the relatively 'least risky' or 'most risky'" alternatives among eleven potential oil ports in British Columbia and Washington State. Prevention, cleanup and compensatory measures are considered.

[from Aquatic Sciences and Fisheries Abstracts 9(1):237. 1979]

80B-0972
LAGRANGIAN SURFACE CURRENT MEASUREMENTS ON THE OUTER CONTINENTAL SHELF
Hansen, D.V. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 14. Transport. Report NOAA/ERL-AR-77-14. p.554-573.

Baseline studies, Predictions, Fate, Drift, Spill trajectories, Monitoring, Sea surface, OCS, Bering Sea

"The objectives of this work are to obtain Lagrangian current data for assessment of probably trajectories of oil spills in the Gulf of Alaska and the S.E. Bering Sea using drogued free drifting buoys located several times daily by a satellite positioning system. Results show that at least during summer conditions, materials released on the surface between Yakutat and Kayak Island will move generally westward at typical speeds of 10 miles/day or less."

[from Aquatic Sciences and Fisheries Abstracts 8(9):145. 1978]

80B-0973
COASTAL MORPHOLOGY, SEDIMENTATION AND OIL SPILL VULNERABILITY
Hayes, M.O. and C.H. Rudy. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 16. Hazards. Report NOAA/ERL-AR-77-16. p.1-86.

Baseline studies, Risk analysis, Sedimentation, Coasts, Shorelines, Gulf of Alaska, *Spill vulnerability

This study indicates that more than half of the nearly 1800 km of Alaskan Gulf shoreline classified are considered high risk environments, where oil would remain for a few years to as much as 10 years. A detailed sedimentological analysis of more than 400 samples collected is presented.

[from Aquatic Sciences and Fisheries Abstracts 8(9):146. 1978]

80B-0974
RAZOR CLAM (SILIQUA PATULA, DIXON) DISTRIBUTION AND POPULATION ASSESSMENT STUDY
Kaiser, R.J. and D. Konigsberg. 1977.
U.S. National Oceanic and Atmospheri Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 7. Receptors-Fish, Littoral, Benthos. Report NOAA/ERL-AR-77-7. 195-275p.

Baseline studies, Distribution, Monitoring, Mollusks, *Razor clams

"The data gathered indicates that these relatively stable, non-migrant species can be used as a critical monitor of change caused by oil pollution."

[from Aquatic Sciences and Fisheries Abstracts 8(9):44. 1978]

80B-0975
ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. QUARTERLY REPORTS OF PRINCIPAL INVESTIGATORS. APRIL-JUNE 1977.
National Oceanic and Atmospheric Administration. 1977.
Boulder, Colorado, NOAA Environmental Research Laboratories, NTIS Report PB-279 875. 943p.

Baseline studies, Environmental effects, OCS, Alaska, Development, Statistics, Information systems, Oil transport

Individual researchers' reports containing baseline data on the Alaskan OCS are compiled. The data will assist in assessing the potential environmental impact from planned oil development in that region. The reports are grouped in the following categories: transport, hazards, and data management.

[from DIALOG Database, File 6, NTIS 64-80/ISS11: #E1365G4. 1980]

80B-0976
ENVIRONMENTAL ASSESSMENT OF THE ALASKAN CONTINENTAL SHELF. PRINCIPAL INVESTIGATOR'S REPORTS JULY-SEPTMEBER 1977. VOLUME 3.
National Oceanic and Atmospheric Administration. 1977.
Boulder, Colorado, NOAA Environmental Research Laboratories, NTIS Report PB-279 913/8ST. 857p.

Baseline studies, Environmental effects, OCS, Alaska, Development, Statistics, Information systems, Oil transport

Individual researchers' reports containing baseline data on the Alaskan OCS are compiled. The data will assist in assessing the potential environmental impact from planned oil development in that area. The reports are grouped in the following categories: transport, hazards, and data management.

[from DIALOG Database File 6, NTIS 64-80/ISS11: #E1365J1. 1980]

80B-0977
STUDY OF MICROBIAL ACTIVITY IN THE BEAUFORT SEA AND THE GULF OF ALASKA AND ANALYSIS OF HYDROCARBON DEGRADATION BY PSYCHROPHILIC MICROORGANISMS
Morita, R.Y. and R.P. Griffiths. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume II. Receptors-Microbiology. NOAA/ERL-AR-77-11. p.222-295.

Baseline studies, Biodegradation, Microorganisms, Sediment, Gulf of Mexico

The sediments had a much higher microbial activity than the water samples studied. This suggests that sediments might be important in the degradation of crude oil and that elements of oil may persist in sediments for long periods of time.

[from Aquatic Sciences and Fisheries Abstracts 8(9):147. 1978]

80B-0978
EAST COAST DAVIS STRAIT ENVIRONMENTAL STUDIES: IMPACT ON OFFSHORE EXPLORATION
Rempel, G., G. Greene, T. Bech. 1978.
Canadian Petroleum Technology 17(1):32.

Baseline studies, Environmental effects, Blowouts, Offshore, Exploration, Canada

"The major threat examined was the impact from the remote possibility of an oil blowout and potential effects of a resulting oil spill." Results indicate that although a few selected species would be impacted, the regional environment was not highly sensitive to adverse impact from a major oil spill.

[from Aquatic Sciences and Fisheries Abstracts 8(11):3. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

5. Baseline and Environmental Impact Studies

80B-0979
OCS OIL & GAS - AN ASSESSMENT OF THE DEPARTMENT OF THE INTERIOR ENVIRONMENTAL STUDIES PROGRAM. [BOOK REVIEW]
Richard, C.C. 1979.
Ocean Engineering 6(5):551.

Baseline studies, OCS, Oil-gas leasing, Exploration, Development, US, Government agencies, *Department of Interior

The title book [National Academy of Sciences, Washington, D.C. 1973.] summarizes the then-current status of the outer continental shelf program.

80B-0980
DYNAMICS OF NEAR SHORE ICE
Untersteiner, N. and M.D. Coon. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 16. Hazards. Report NOAA/ERL-AR-77-16. p.164-332.

Baseline studies, Ice, Spill trajectories, Movement, Drift, Beaufort Sea, *Chukchi Sea

"The objective of this field program was to determine the kinematics of ice in the Beaufort and Chukchi Seas by satellite tracking of data buoys." Since most oil spilled in the Arctic will be trapped and transported by sea ice, the trajectories of the ice being developed will provide baseline information on pollutant transport in ice.

[from Aquatic Sciences and Fisheries Abstracts 8(9):145-146. 1978]

6. Legal and Regulatory Aspects

80B-0981
SETTING STANDARDS FOR CHRONIC OIL DISCHARGES IN THE NORTH SEA
Fischer, D.W. and D. von Winterfeldt. 1978.
Journal of Environmental Management 7(2):177-199.

Oil discharges, Chronic effects, Socioeconomic effects, Norway, UK, North Sea, Regulations, Equipment

"Beginning with the premise that standard-setting is a socio-economic problem involving a bargaining process among actors...[the authors] have attempted to show how this process has evolved for a specific case. A comparison and evaluation is made of the decision process by which Norwegian and UK regulators arrived at oil discharge standards." Four major findings are noted: (1) the similarity of standards despite differing approaches; (2) entrepreneurial endeavor for equipment as a key parameter; (3) lack of information on oil effects; and (4) minimal role of environmental quality factors in setting standards.

[from Aquatic Sciences and Fisheries Abstracts 9(5):151. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

6. Legal and Regulatory Aspects

80B-0982
FEDERAL COMMON LAW AND OCEAN POLLUTION. A PRIVATE REMEDY FOR OIL POLLUTION DAMAGE?
Glaeser, J.M. 1977.
Environmental Law 8(1):1-46.

Regulations, Legislation, Compensation, Liability

"The emphasis of this paper is on the lack of available private remedies and the potential for federally formed common law to fill the gaps in the current legal regimes for compensation." The development of federal common law since 1938, and its efficacy as an interim solution are discussed. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(3):170. 1979]

80B-0983
AN OVERVIEW OF OFFSHORE ENVIRONMENTAL POLLUTION LAWS AND REGULATIONS IN CANADA, GREENLAND AND THE NORTH SEA
Sackinger, W.M. 1978.
29th AAAS Alaska Science Conference, 15 August 1978. 27p.

Offshore, Oil discharges, International agreements, Regulations, OCS, Alaska

"A brief review of pertinent provisions in the international law covering oil discharges at sea is given, followed by an outline of the framework of environmental pollution law and regulation" in the title region. Implications for the developing Alaskan Outer Continental Shelf are included.

[from Aquatic Sciences and Fisheries Abstracts 9(2):227. 1979]

80B-0984
OIL POLLUTION LAW AND THE LIMITATION OF LIABILITY ACT: A MURKY SEA FOR CLAIMANTS AGAINST VESSELS
Sisson, F.E.III. 1978.
Journal of Maritime Law and Commerce 9(3):285-341.

Liability, Ships, Pollution control, Water quality, US, Florida

The 125-year-old Act protecting shipowners from extensive claims has been modified by the Water Quality Improvement Act of 1970 (WQIA) and the Florida Oil-Spill Prevention and Control Act. Challenges to this Act as well as general provisions of all three are examined.

[from Oceanic Abstracts 15(5):78-06794. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

6. Legal and Regulatory Aspects

80B-0985
OIL POLLUTION CONTROL MECHANISMS - STATUTES AND REGULATIONS
University of Mississippi Law Center. 1978.
Ocean Springs, MS, Mississippi/Alabama Sea Grant Consortium Report,
MASGP-78-014, Sea Grant No. 04-7-158-44107. 73p.

Pollution prevention, Pollution control, Regulations, US Government

The purpose of this report is to provide a detailed analysis of federal statutes and regulations, as well as case law, bearing on oil spill prevention and control. The emphasis is on federal action occurring after a spill.

[from Aquatic Sciences and Fisheries Abstracts 8(11):253. 1978]

7. General Aspects

80B-0986
ANGER IN BRITTANY [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(5):115.

English Channel, France, Government agencies, Tanio spill

The people of Brittany were upset over the French government's delay in dealing with the oil flow from the wrecked tanker Tanio, which sank in the English Channel on March 7, 1980. The people of the area have protested by covering the streets and hillsides with slogans and dumping some of the Tanio oil outside the Elysée Palace.

80B-0987
DAMAGE TO ENVIRONMENT CAN CAUSE DISEASE IN MARINE ANIMALS [NEWS BRIEF]
Anon. 1977.
Maritimes 21(3):4-6.

Environmental effects, Marine organisms, US. *Research programs

"This paper discusses several research programmes in the US which are concerned with the effect of oil pollution on, and the environmental pathology of marine organisms."

[from Aquatic Sciences and Fisheries Abstracts 8(11):237. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-0988
THE DISASTER THAT LEAD TO ACTION [NEWS BRIEF]
Anon. 1977.
Safety at Sea International, No. 104:20-21.

Torrey Canyon spill, Dispersants, IMCO, Spill response

"The sinking of the Torrey Canyon in March 1967 caused the worst oil pollution incident in history. The destruction of the ship and the methods used to dispel the oil are discussed in this article. The efforts of the IMCO in combating oil pollution since that time are also discussed."

[from Aquatic Sciences and Fisheries Abstracts 8(6):132. 1978]

80B-0989
POST-MORTEM ON AMOCO CADIZ [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(1):3.

Amoco Cadiz spill, Beaches, Coasts, Environmental effects, Fisheries, France

A 4-day conference at the Oceanographic Laboratory of CNEXO at Brest, France, reviewed the scientific investigations on the impacts of the Amoco Cadiz spill. It was found after the first winter that most of the affected beaches returned to a substantially normal condition. The main commercial damage was suffered by the oyster industry and the severest ecological damage was done to a salt marsh as the result of several roadways built across it to give accessway to clean-up equipment.

80B-0990
RED SEA DECLINE [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(5):115.

Sources, Pollution control, Ecosystems, Red Sea

According to a report by the Tunis-based Arab League Educational, Cultural and Scientific Organization (ALESCO), pollution in the Red Sea is reaching a critical level. Four main sources of pollution are identified: Domestic sewage, industrial wastes, pollution from dredging operations, and oil. The report warns that steps are needed to control oil pollution urgently, otherwise irreparable damage to marine ecosystems will occur.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-0991
ANNUAL REPORT 1977
Advisory Committee on Oil Pollution of the Sea. 1978.
Annual Report of the Advisory Committee on Oil Pollution of the Sea, UK. 38p.

Pollution control, Marine environment, UK

Summary not available.

[from Aquatic Sciences and Fisheries Abstracts 9(3):1. 1979]

80B-0992
CONFERENCE ON ASSESSMENT OF ECOLOGICAL INMPACTS OF OIL SPILLS
American Institute of Biological Sciences. 1978.
Report CONF-780661. 944p.

Biological effects, Wildlife, Benthos, Cold climates, Legislation, Socio-economic effects, Ekofisk blowout, *AIBS, *Proceedings

"Forty one papers presented at this conference covered the following subjects: socio-economic-legal aspects of oil spills, impact of spills on wildlife and benthic organisms, effect of spills on extreme climatic zones, impact of the Ekofisk Bravo Blowout."

[from UDS Water Quality Control Digest 10(6):II-67, #9J-118. 1979]

80B-0993
ACTIVITIES CONCERNING THE MARINE ENVIRONMENT AND POLLUTION IN TURKEY
Atuk, N., N.S. Ugural and M. Atalay. 1978.
Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. p.59-67.

Contamination, Marine environment, Detection, Monitoring, Pollution control, Oil transport, Refining, *Turkey

This paper outlines ongoing pollution-related studies carried out by the Turkish government, the TPAO-Turkish Petroleum Company and other oil industry groups, and several academic institutions, especially the Marine Sciences Department of the Middle East Technical University. The various studies include oil pollution detection and monitoring in coastal waters and pollution prevention and control in oil production, refining and transport by pipeline and tankers.

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-0994
PRELIMINARY OBSERVATIONS DEDUCTED [SIC] FROM RESEARCH PROGRAMS UNDERTAKEN BY THE ROSCOFF BIOLOGICAL STATION [ENGLISH SUMMARY]
Bergerard, J. 1978.
Amoco Cadiz. Preliminary Observations of the Oil Spill Impact on the Marine Environment. One Day Session Amoco Cadiz, Brest, France. June 7, 1978. G. Conan, L. D'Ozouville and M. Marchand (eds.). Brest, CNEXO/COB, 1978. p.151-158.

Amoco Cadiz spill, Benthos, Environmental effects, Coastal waters, France

The author presents an overview of studies in progress at the time of the Amoco Cadiz grounding. Concentration of the report is on benthic population dynamics studies at the title laboratory. The impact of the oil spill upon such ongoing studies is assessed.

[from Aquatic Sciences and Fisheries Abstracts 9(4):187. 1979]

80B-0995
THE OIL POLLUTION INDUSTRY [BOOK REVIEW]
Bourne, W.R.P. 1980.
Marine Pollution Bulletin 11(1):27-28.

Spill response, Birds, Oil industry, Book review, *Bird protection

A review is given of the document entitled Marine Oil Pollution and Birds, by J.H. Andrews and K.T. Standring [Great Britain Royal Society for the Protection of Birds, 1979. V+126p.] "It is clear and well-written, provides a useful elementary guide to the problem and ends with 41 hopeful recommendations for action..." The report is obtainable from the RSPB Conservation Planning Department, The Lodge, Sandy, Beds, SG192DL, UK.

80B-0996
OIL SPILLS: DANGER IN THE SEA
Brown, J.E. 1978.
New York, Dodd, Mead & Company, 1978. 123p.

Fate, Environmental effects, Oil spills, Marine environment, Spill cleanup, Equipment

"Sources of oil spills in the marine environment are examined along with cleanup techniques and equipment. The fate and impacts of oil in the sea environment are investigated. Possible solutions to the oil spill problem, including the development of alternative energy sources, are reviewed."

[from Pollution Abstracts 10(5):859. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-0997
ECOLOGICAL STUDIES OF THE COASTAL ZONE AFFECTED BY POLLUTION FROM THE NORTHERN BREEZE. I. GENERAL INTRODUCTION AND BEACH COMMUNITIES AT ARENA.
Castilla, J.C., M. Sanchez and O. Mena. 1977.
Medio Ambiente 2(2):53-64.

Beaches, Sediments, Intertidal zone, Environmental effects, Chile, *Northern Breeze spill

"This paper presents the results of an ecological survey of a part of Chilean sandy beaches affected by an oil spillage caused by the Liberian merchant ship Northern Breeze which went aground in Farellones de Quintero, Chile on September 15, 1975."

[from Aquatic Sciences and Fisheries Abstracts 8(2):179. 1978]

80B-0998
THE AMOCO CADIZ DISASTER [IN FRENCH]
Colin, A., J.M. Giraud, M. Chauty, P. Noe and P. Marzin (eds.). 1978.
Paris, France, Senat, Commission d'Enquete Parlementaire, Report-Paris, Machette, 1978. 313p. (ISBN 2-01-00-5781-3.)

Amoco Cadiz spill, Environmental effects, Economic effects, France

The circumstances attending the grounding of the Amoco Cadiz in March 1978, the extent of pollution, the POLMAR contingency plan, and ecological and economic consequences are evaluated by the Commission d'Enquete by request of the French government.

[from Aquatic Sciences and Fisheries Abstracts 9(3):145. 1979]

80B-0999
A SELECTED BIBLIOGRAPHY OF THE FARE AND EFFECTS OF OIL POLLUTION RELEVANT TO THE CANADIAN MARINE ENVIRONMENT
Department of Fisheries and Environment, Canada. 1977.
Ottawa, Canada, Department of Fisheries and Environment, Environmental Impact Control Directorate, Fate and Effect of Oil Working Group, 1978. Economic and Technical Review Report EPS-3-EC-77-23. 174p.

Fate, Environmental effects, Bibliographies, Marine environment, Canada

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:85, #4250. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1000
THE BOUCHARD NO. 65 OIL SPILL IN THE ICE-COVERED WATER OF BUZZARDS BAY
Deslauriers, P.C. 1979.
Journal of Petroleum Technology 31(9):1092-1100.

Behavior, Cold climates, Ice, Bouchard 65 spill, Bays, Buzzards Bay, Spill response

This article is a chronology and analysis of events and conditions surrounding the Buzzards Bay spill on January 28, 1977. Field measurements and observations made from January 29 until February 25, 1977 are presented, and results put in perspective with the present state of the art. With growing interest in cold-region petroleum development, application of experience from the title spill could be useful if limitations expressed in the study are taken into account. Of particular interest would be behavior of the oil in specific ice conditions found in the Bay.

80B-1001
MARINE POLLUTION BY HYDROCARBONS WITH PARTICULAR REFERENCE TO THE MEDITERRANEAN [ENGLISH SUMMARY]
Fierro, G. 1977.
Atti della Accademia Ligure di Scienze e Lettere, Vol. 34:55-58.

Hydrocarbons, Contamination, Mediterranean Sea

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:89, #4295. 1979]

80B-1002
GROUND-WATER POLLUTION BY TRANSFER OF OIL HYDROCARBONS
Fried, J.J., et al. 1979.
Ground Water 17(6):586-594.

Groundwater, Oil transfer, Hydrocarbons, Contamination

"An important aspect of the pollution of a phreatic aquifer by hydrocarbons is the oil-water contact and transfer of soluble substances from the oil into the ground water. A systematic study of this transfer of matter in a saturated porous medium... is performed with an experimental device made up of a porous matrix containing the oil phase, steady and crossed by a unidirectional flow of water..."

[from UDS Water Quality Control Digest 11(1):IV-04, #9L-103. 1980]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1003
MARINE ENVIRONMENTAL POLLUTION. VOLUME 1. HYDROCARBONS
Geyer, R.A. 1980.
Amsterdam, the Netherlands, Elsevier Scientific Publishing Company, 1980. 600p?

Hydrocarbons, Marine environment, Contamination

Summary not available.

[from Elsevier Earth Sciences Catalogue, 1980. p.24]

80B-1004
THE USNS POTOMAC OIL SPILL: A JOINT REPORT ON SCIENTIFIC STUDIES AND IMPACT ASSESSMENT BY THE NOAA-USGS SPILLED OIL RESEARCH TEAM AND THE GREENLAND FISHERIES INVESTIGATIONS
Grose, P.L., J.S. Mattson, and H. Petersen. 1979.
Ministry for Greenland, 1979. 160p. [in press]

Environmental effects, NOAA, USGS, *USNS Potomac spill, *Research results, *Greenland Fisheries Investigations

Summary not available.

[from Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.1.16.].

80B-1005
IMPACT OF OIL ON THE MARINE ENVIRONMENT
IMCO/FAO/UNESCO/WHO, et al. 1977.
Joint Group of Experts on the Scientific Aspects of Marine Pollution, 1977. Rome, FAO, Reports and Studies, GESAMP, No. 6:129-237. Report ISBN 92-5-100219-3.

Environmental effects, Marine environment, Sublethal effects, Carcinogens, Marine organisms, Health hazards, UN

This report evaluates the impacts of deoxygenation, tainting, carcinogenesis, effects of microbial populations, lethal and sublethal effects of oil, heating effects and routes into and within biosystems. "Evidence was not found, however, that an unequivocal link exists between the presence in the sea of carcinogens found in the oil and carcinomas in marine organisms or of the presence in seafood of carcinogens from oil and cancer in man.

[from Aquatic Sciences and Fisheries Abstracts 8(3):110. 1978]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION
7. General Aspects

80B-1006
POLYNUCLEAR AROMATIC HYDROCARBONS
Jones, P.W. and P. Leber. 1979.
Ann Arbor, Michigan, Ann Arbor Science Publishers, Inc. 1979. 902p.

PAH, Chemical analysis, Analytical techniques, Biological effects, Contamination, Metabolism, Carcinogens, Mutagens, Bibliographies

"This new volume contains the most comprehensive and up-to-date reporting of work in the subject of polynuclear aromatic hydrocarbons (PAHs) probably the most widespread of all chemical environmental contaminants... The biologically oriented papers provide some of the most recent advances in the mechanistic exploration of metabolism and carcinogenesis of PAHs." The book is divided into two major sections: chemistry of PAHs, and Biology of PAHs. Over 1500 references are included. [possibly oil pollution related]

[from Ann Arbor Science Publishers, Inc. pamphlet. 1979]

80B-1007
KEEPING IT CLEAN OFFSHORE IRELAND
Levigne, D. 1978.
Offshore Review 1(3):14-18.

Environmental effects, Spill response, Offshore, Ireland

In light of past disastrous oil spillages, this article examines the possible effects of oil spillage and suggests preventative measures to combat such an event in Ireland's coastal waters.

[from Aquatic Sciences and Fisheries Abstracts 8(11):252. 1978]

80B-1008
RESEARCH IN OIL, GAS AND ICE AT THE UNIVERSITY OF TORONTO
Mackay, D., K. Hossain and A. Kisil. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.27-31.
Publication No. EE-14.

Behavior, Spill cleanup, Arctic, Ice, Canada, *Research review

"This is a brief review of the work which has taken place in recent years at the University of Toronto on the physical behavior of, and cleanup measures for, oil and gas in the presence of ice."

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1009

DESIGN OF FIELD EXPERIMENTS TO DETERMINE THE ECOLOGICAL EFFECTS OF PETROLEUM IN INTERTIDAL ECOSYSTEMS

Moore, S.F. and D.B. McLaughlin. 1978.

Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p. 270-290. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Oil spills, Intertidal zone, Biological effects, Physical effects, Chemical effects, *Experimental design

The experiments are designed to study the effects of oil in the upper rocky intertidal community on species abundance and distribution resulting from the following types of disturbances: 1) physical/chemical disturbance; 2) direct competition for space; 3) disruption of competition and predation; and 4) interaction with natural processes such as wave exposure and dissication. "A principal outcome of the study is a set of ecological and statistical design criteria to guide the translation of this overall objective into specific experimental designs."

[from Aquatic Sciences and Fisheries Abstracts 9(4):182. 1979]

80B-1010

CONTRIBUTION TO THE STUDY OF THE EFFECTS ON THE SHORES OF CORUNA (SPAIN) CAUSED BY OIL SPILL IN THE ACCIDENT OF THE OIL TANKER MONTE URQUICLA (MAY 1976) [ENGLISH SUMMARY]

Palomo, C., J. Acosta, J.R. De Andres, P. Herranz, J. Rey and J.L. Sanz. 1978.

Boletin del Insituto Espanol de Oceanografia, Vol. 4(pt.1):131-162. Boletin no. 245.

Urquiola spill, Environmental effects, Sedimentation, Distribution

Beach morphology, oceanographic and meteorological factors responsible for the distribution of oil spilled from the tanker Monte Urquiola were studied. A sedimentation model for oil distribution on the beaches was developed. [also published in Deep Sea Research Oceanographic Literature Review 26(3B):155. 1978]

[from Aquatic Sciences and Fisheries Abstracts 9(3):156. 1979]

80B-1011

CONTAMINATION OF SEA BY OIL AND ITS DERIVATIVES [IN CROATIAN]

Picer, M. 1977.

Pomorski Zbornik, Vol. 15:437-470.

Marine environment, Contamination, Petroleum products

Summary not available.

[from Workshop on Pollution of the Mediterranean, Antalya, Turkey, 24-27 November 1978. Monaco, CIESM, 1979. Proceedings. p.101]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1012
SEA POLLUTION AND ITS IMPACT ON THE QUALITY AND ABUNDANCE OF FISH AND SHELLFISH POPULATIONS IN THE NORTH-EAST ATLANTIC AREA
Preston, A. 1978.
Marine Policy 2(2):151-152.

Europe, Atlantic Ocean, Regulations, Monitoring, Fisheries

The title paper mentions activities of the Western European community relating to regulations and monitoring. ICES published reports are cited, concluding that average pollutant levels in the title region are within recommended limits, though regional variations warrant investigation. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(3):170. 1979]

80B-1013
SEA POLLUTION AND ITS IMPACT ON THE QUALITY AND ABUNDANCE OF FISH AND SHELLFISH POPULATIONS IN THE MEDITERRANEAN AREA
Saliba, L.J. 1978.
Marine Policy 2(2):152-153.

Contamination, Mediterranean Sea, Mortality, Sublethal effects, Fisheries, UN, *FAO

Mediterranean pollution is increasing: oil and pesticides are particularly responsible for sublethal physiological abnormalities, disruption of food chains and mortality. Action on pollution control and moderate interest in conservation of fish and shellfish stocks are attributed to UNEP, FAO and the Blue Plan for the Mediterranean.

[from Aquatic Sciences and Fisheries Abstracts 9(3):170. 1979]

80B-1014
AFTERMATH OF THE *AMOCO CADIZ*: SHORELINE IMPACT OF THE OIL SPILLS
Schneider, E.D. 1978.
Oceans 11(4):57-59.

Amoco Cadiz spill, Shorelines, Environmental effects, Liability, Chronic effects, Coasts, France

"A non-technical account of the long-term impact of the *Amoco Cadiz* oil spill on the Brittany coast is presented, based largely on the author's general impressions of the area affected." The long-term restrictions on the recovery of key populations and the whole ecosystem are emphasized. The content of administrative initiatives-financial compensation and determination of liability-are examined from the view that concentration on prevention might have constituted more appropriate action.

[from Aquatic Sciences and Fisheries Abstracts 9(5):145. 1979]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1015
SUBJECT CLASSIFIED LITERATURE REFERENCES ON EFFECTS OF OIL POLLUTION IN ARCTIC AND SUBARCTIC WATERS
Stansky, M.E. and I. Diamant. 1978.
Seattle, USNOAA, National Marine Fisheries Service, Northwest and Alaska Fisheries Center, 1978. 201p.

Environmental effects, NOAA, Arctic, Subarctic regions, Bibliographies

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:85, #4254.]

80B-1016
THE WEST FALMOUTH OIL SPILL: HYDROCARBONS IN THE SALT MARSH ECOSYSTEM
Teal, J.M. and K.A. Burns. 1979.
Estuarine and Coastal Marine Science 8(4):349-360.

Ecosystems, Environmental effects, Sediments, Crustaceans, Contamination, Narragansett Bay, Massachusetts

"Marsh surface sediments, cores, and organisms were analyzed for hydrocarbons from 1 to 7 years after the spill in Sept. 1969 of No. 2 fuel oil. All organisms analyzed showed contamination initially. Fundulus were nearly free of oil after 1 year, but Uca remained heavily contaminated for ≥ 4 years. Alkanes disappeared in sediments after ≈ 4 years, whereas heavy aromatics and naphthenes persisted throughout the study."

[from Pollution Abstracts 11(3):477-478. 1980]

80B-1017
THE EFFECTS OF MARINE POLLUTION: SOME RESEARCH NEEDS [BOOK REVIEW]
Waldichuk, M. 1980.
Marine Pollution Bulletin 11(6):175-176.

Biodegradation, Contamination, Environmental effects, Estuaries, Coastal waters, Sediments, Sources, Distribution

This booklet was prepared by the British National Committee on Oceanic Research and examines 1) chemical speciation; 2) mechanisms of bioaccumulation; 3) biodegradability; 4) assessment of effects of contaminants; 5) ecological aspects of marine pollution; 6) the estuary-sea boundary; 7) pollutant exchange between water, sediments and biota; 8) the atmospheric contribution to marine pollution; and 9) the atmospheric breakdown and modification of marine contaminants. [possibly oil pollution related]

C. ENVIRONMENTAL IMPACTS OF OIL POLLUTION

7. General Aspects

80B-1018
TECHNOLOGY ASSESSMENT AND THE OCEANS
Wilmot, P.D. and A. Slingerland (eds.). 1977.
International Conference on Technology Assessment, Monaco,
26-30 October 1975. Boulder, Colorado, Westview Press, 1977.
259p. ISTA Documentation Series, Vol. 1.

Marine environment, Offshore, Development

Organized by the International Society for Technology Assessment and the Association Europeenne Oceanique (EUROCEAN), the conference considered a variety of topics, including cross-impact studies, offshore oil and marine pollution.

[from Oceanic Abstracts 55(5):78-07119. 1978]

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1019
DISTRIBUTION OF HYDROCARBON-UTILIZING MICROORGANISMS AND HYDROCARBON BIODEGRADATION POTENTIALS IN ALASKAN CONTINENTAL SHELF AREAS
Atlas, R.M. and G. Roubal. 1978.
Applied and Environmental Microbiology 35(5):897-905.

Biodegradation, Distribution, Microorganisms, OCS, Alaska, *Cook Inlet

Enumeration of subject organisms was effected with plate counts and a new most-probable-number procedure based on mineralization of ^{14}C-labeled hydrocarbons. Seasonal differences in numbers occurred. Distribution within Cook Inlet was positively correlated with the occurrence of hydrocarbons in the environment. ^{14}C-radiolabeled hydrocarbon-spiked crude oil measured biodegradation potentials; no correlation with utilizer-distribution was observed.

[from Oceanic Abstracts 15(5):78-06625. 1978]

80B-1020
POLYCYCLIC AROMATIC HYDROCARBONS: METABOLISM AND ENVIRONMENTAL ASPECTS
Cripps, R.E. and R.J. Watkinson. 1978.
Developments in Biodegradation of Hydrocarbons -1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.113-134.

Biodegradation, Uptake, Metabolism, Microorganisms, Mammals, Environmental effects

"The metabolism of polycyclic aromatic hydrocarbons (PAHs) by mammalian and microbial systems shows variations in the initial reaction with oxygenase enzymes that are important in the carcinogenic effects in higher organisms by some members of this class of compounds. The routes of metabolism of the simpler members by a variety of organisms are discussed."

80B-1021
DEGRADATION OF HYDROCARBONS IN OXIDIZED AND REDUCED SEDIMENTS
Delaune, R.D., G.A. Hambrick and W.H. Patrick, Jr. 1980.
Marine Pollution Bulletin 11(4):103-106.

Biodegradation, Oxidation, Sediments, Physical aspects

This study indicates that the biological breakdown of hydrocarbon is likely to be influcenced by the oxidation-reduction status of sediment. Degradation of ^{14}C-labelled octadecane and ^{14}C-labelled naphthalene was faster in oxidized sediments compared with reduced sediments. Indicated also is that sediments contain zones of varying intensities of oxidation-reduction as measured by redox potential of the sediment.

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1022

RESEARCH INTO THE CONTENT OF OIL DROPLETS, DETERGENTS AND BACTERIA IN THE SEA WATER AND SEA BEDS OF THE NORTH TYRRHENIAN SEA

De Renzi, G.P., R. Palmerini Morelli, P. Orlando, S. Viola and C. Dardinelli. 1978.

Workshop on Pollution of the Mediterranean Sea, Concentrations, Distribution, Bacteria, Seawater, Sediments, *Detergents

Results of oceanographic research in part of the Western Mediterranean Sea indicates that because of the lack of hydrocarbon oxidizers, "bacterial biodegradation is, evidently, extremely slow, so much so as to permit hydrocarbons and detergents to be found even in sea sediments."

80B-1023

EFFECT OF ENVIRONMENTAL PARAMETERS ON THE BIODEGRADATION OF OIL SLUDGE

Dibble, J.T. and R. Bartha. 1979.

Applied and Environmental Biology 37(4):729-739.

Biodegradation, Refineries, Waste oil, Sludge, Land farming, Disposal

Landfarming of oily refinergy sludges was evaluated as a waste disposal method. The parameters studied were soil moisture, pH, mineral nutrients, micronutrients, organic supplements, treatment dose and frequency and incubation temperature. Optimal environmental parameters for sludge biodegradation were experimentally derived and are detailed in this paper.

80B-1024

A SCIENTIFIC STUDY TO DEVELOP A PRACTICAL METHOD FOR ASSESSING THE CLEANUP OF SOUR (HIGH SULPHUR) CRUDE OIL SPILLS IN LITTORAL SANDS USING BENTHIC MICROORGANISMS

Frankel, L. 1979.

U.S. Coast Guard Report CG-D-27-79, Contract DOT-CG-81-77-1782. 49p.

NTIS Report AD-A075 763.

Biodegradation, Spill cleanup, Crude oil, Beaches, Sediments, Shorelines, Microorganisms, Connecticut

In the title study, crude oil was spilled on beaches at 3 localities along the Connecticut shoreline where different environments are present. The microbiota and sediments in oiled plots were compared to those in unoiled plots for up to 15 months. "The study showed that microorganisms cannot be used as indicators of the effectiveness of cleanup operations in these sediments," because little difference in species diversity and number was noted in oiled and unoiled plots.

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1025
DEGRADATION OF SELECTED POLYCYCLIC AROMATIC HYDROCARBONS IN COASTAL SEDIMENTS: IMPORTANCE OF MICROBES AND POLYCHAETE WORMS
Gardner, W.S., R.F. Lee, K.R. Tenore and L.W. Smith. 1979.
Water, Air, and Soil Pollution 11(3):339-347.

Biodegradation, Benthos, Sediments, Coasts, Detection, PAH, Microorganisms, Annelids

In the title study, three types of sediment (fine sand, medium sand, and marsh sediment) with and without the benthic polychaete worms, *Capitella capitata*, were used. After extraction from the sediment, PAH were measured by liquid chromatography with fluorescent detection. *C. capitata* was found to stimulate PAH degradation and microbial degradation was more rapid in upper layers of the sediments.

80B-1026
BIODEGRADATION OF HYDROCARBON-BASED PRODUCTS IN INDUSTRIAL USE
Hill, E.C. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.). London, Applied Science Publishers Ltd., 1978. p.201-226.

Biodegradation, Petroleum products, Industries, Microorganisms

This paper attempts to classify the wide range of 'spoilage' (growth of microorganisms in petroleum products) problems which exist so that their onset, development and treatment may be better understood.

80B-1027
DEGRADATION OF THE CRUDE OIL BY *ARTHROBACTER SP*. [ENGLISH SUMMARY]
Hirayama, M. and S. Nagata. 1979
Bulletin of the Japanese Society of Scientific Fisheries 45(11):1443-1447.

Biodegradation, Crude oil, Bacteria, Hydrocarbons, **Arthrobacter sp*.

The results of an experiment using the *Arthrobacter sp*. to determine biodegradation of Kuwait crude oil indicate that the largest degradation period is during the first three days. After 6 to 9 days incubation the amount of aliphatic hydrocarbon components decreased; however an increase in polycyclic aromatic polar compounds was observed.

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1028
MICROBIAL DEGRADATION OF AROMATIC HYDROCARBONS
Hopper, D.J. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.85-112.

Biodegradation, Aromatic hydrocarbons, Microorganisms

"Microbial degradation follows the pattern seen for the aerobic breakdown of other aromatic compounds in that dihydric phenols, e.g. catechols, protocatechuic acid, are formed as substrates for ring fission. This involves the insertion of two hydroxyl groups into the aromatic ring... Evidence for these reactions and the characteristics of some of the enzymes which catalyse the early steps are described. Pathways for the further degradation of the ring fission substrates are also outlined."

80B-1029
HOW MAN AIDS OCEANS TO CLEANSE THEMSELVES OF OIL POLLUTION
Hull, E.W.S. 1979.
South African Shipping News and Fishing Industry Review 34(7):37-39.

Biodegradation, Bacteria, Oil spills

"The use of petrophilic bacteria is discussed. General Electric has combined the digestive capabilities of 4 different hydrocarbon-consuming bacteria into a single manmade strain capable of processing ≈ 2/3 of the hydrocarbons involved in an oil spill, at a rate several times faster than any natural organism."

[from Pollution Abstracts 11(4):693. 1980]

80B-1030
EFFECTIVENESS OF SURFACTANTS IN THE MICROBIAL DEGRADATION OF OIL
Lupton, F.S. and K.C. Marshall. 1979.
Geomicrobiological Journal 1(3):235-249.

Biodegradation, Microorganisms, Surfactants, Growth, Hydrocarbons

Nonionic surfactants increased the rate of selective hydrocarbon utilization by *Acinetobacter* SL1. The ionic surfactants Na dodecyl sulfate and cetyltrimethylammonium bromide inhibited microbial growth on hydrocarbon substrates.

[from Chemical Abstracts 91(8): #117, 889s. 1980]

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1031
DEVELOPMENT OF PROTOZOAN COMMUNITIES ON OIL IN SEA WATER [ENGLISH SUMMARY]
Mironov, O.G. and S.U. Avdeeva. 1978.
Biologicheskie Nauki, No. 10:48-50.

Biodegradation, Crude oil, Sea water, Microorganisms, Marine organisms, Mollusks, *Nematodes, *Polychaetes, *Substrates

Oil residues in a continuous flow aquarium were found to support protozoan development (infusorians and hydrocarbon-oxidizing bacteria): in addition, the experiment analyzes the use of oil in sea water as a substrate for mollusc larvae, diatoms, nematodes and polychaetes.

[from Aquatic Sciences and Fisheries Abstracts 9(5):110. 1979]

80B-1032
MICROBIOLOGICAL ASPECTS OF THE SELFPURIFICATION OF AQUATIC ENVIRONMENT FROM OIL [IN RUSSIAN]
Mironov, O.G. 1977.
Selfpurification of Water Bodies and Biological Treatment of Sewage Water. Moscow, VINITI, 1977. p.138-168. (Itogi Nauki i Tekniki: Obshchaya Ekologiya, Biotsenologiya, Gidrobiologiya. Vol.4).

Biodegradation, Bacteria, Marine environment, Contamination

The summary of published data on the role of physico-chemical factors in hydrocarbon transformation in the marine environment focuses on biological aspects. Petroleum-oxidizing bacteria are examined and the role of these microorganisms in aquatic oil pollutant destruction is demonstrated via numerous examples.

[from Aquatic Sciences and Fisheries Abstracts 9(2):213. 1979]

80B-1033
EXPERIMENTAL DEGRADATION OF CRUDE OIL BY MARINE BACTERIA
Nagata, S., G. Kondo and T. Asano. 1978.
Journal of the Oceanographic Society of Japan, Vol. 34:105-107.

Biodegradation, Bacteria, Crude oil

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:83, #4234. 1979]

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1034

ELECTROCHEMICAL STUDY ON THE BIODEGRADABILITY OF CRUDE OIL IN SEA WATER [ENGLISH SUMMARY]

Popescu, B. and V. Brinzoi. 1978.
Revista Chimica 29(3):229-234.

Biodegradation, Crude oil, Seawater, *Steel corrosion resistance

The title study was carried out on steel alloys OL-37, OL-42, OLC-35, W_2A, W_2A and Fe-Cr 14 electrodes in different marine environmental conditions. The corrosion resistance of steel alloys was found to increase as the intensity of biodegradation increased.

[from Aquatic Sciences and Fisheries Abstracts 8(9):141. 1978]

80B-1035

DEGRADATION OF ALIPHATIC HYDROCARBONS

Ratledge, C. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.1-46.

Biodegradation, Toxicity, Uptake, Oxidation, Hydrocarbons, *Aliphatics

The past five to six years of research is reviewed in three sections: assimilation, specificity, and toxicity of hydrocarbons; the mechanisms of oxidation of alkanes, alkenes, and branched-chain alkanes; and morphological changes in cells and cell composition.

80B-1036

MICROBIAL DEGRADATION OF ALICYCLIC HYDROCARBONS

Trudgill, P.W. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.47-84.

Biodegradation, Microorganisms, Metabolism, Hydrocarbons, *Alicyclic hydrocarbons

"Four basic patterns of alicyclic ring cleavage have been described: a) subsequent to conversion to a Ketone, mono-oxygenation by a biologically Baeyer-Villiger reaction yields a hydrolysable or inherently-unstable lactone; b) conversion of alicyclic hydrocarbons carrying alkyl side chains to cyclohexane carboxylate is followed either by β-oxidation of the CoA-ester of the acid or by hydroxylation and dehydrogenation to yield 4-oxocyclohexane carboxylate which is then aromatised to p-hydroxybenzoate and further metabolized by well-described pathways; c) hydrolytic cleavage following conversion to a 1,2-diketone." [possibly oil pollution related]

D. FATE OI OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1037
PROCESSES OF MICROBIAL OIL OXIDATION IN THE SEA (REVIEW) [ENGLISH SUMMARY]
Tsyban', A.V. and A.I. Simonov. 1978.
Okeanologiya 18(4):695-708.

Biodegradation, Weathering, Oxidation, Microorganisms, USSR

The paper reviews and analyzes recent findings on the title subject: topics included are (1) the best methods of study, (2) bacteria distribution in coastal and offshore waters of the World Ocean, (3) specificity in substrate selection by microbial forms, (4) the role of cooxidative pollutant degradation, (5) effects of petroleum and its oxidation products on marine biota, and (6) quantitative aspects of hydrocarbon biodegradation.

[from Aquatic Sciences and Fisheries Abstracts 9(5):136. 1979]

80B-1038
DEGRADATION OF OIL IN THE MARINE ENVIRONMENT
Van der Linden, A.C. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.165-200.

Biodegradation, Marine environment, Microorganisms, Bibliographies

"This paper reviews the literature on microbial degradation of petroleum hydrocarbons in seawater. The subject is treated in relation to other mechanisms causing the disappearance of oil from the sea surface. A few fundamentals of microbiology are further explained and the constitution and characteristics of oil to environmentalists."

80B-1039
MICROBIAL RELEASE OF OIL FROM SOIL COLUMNS
Vanloocke, R. et al. 1979.
Environmental Science and Technology 13(3):346-348.

Biodegradation, Spill cleanup, Groundwater, Soil, Restoration, Recovery, Emulsification

"The possibility of cleanup of subsurface soil horizons polluted with gas oil by activating microbial processes has been investigated." Results from the detailed experiment indicate that irrigating soil with a solution containing ammonium nitrate and peptone, 10 to 20% oil recovery can be expected in a 3 to 4 month period." The process of release is biological. The recovered oil is not emulsified and can be recuperated as a phase."

[from UDS Water Quality Control Digest 10(4): II-42, #96-149. 1979]

D. FATE OF OIL IN THE ENVIRONMENT

1. Biodegradation

80B-1040
DEVELOPMENTS IN BIODEGRADATION OF HYDROCARBONS-1.
Watkinson, R.J. 1978.
Essex, UK, Applied Science Publishers Ltd., 1978. 232 p.

Biodegradation, Hydrocarbons, Microorganisms, Aromatic hydrocarbons, Crude oil, Petroleum products, Metabolism

"This volume covers the investigation and advancements made in the biodegradation of hydrocarbons and oils. The following papers are included: Degradation of aliphatic hydrocarbons, by Ratledge, C; Microbial degradation of alicyclic hydrocarbons, by Trudgill, P.W.; Microbial degradation of aromatic hydrocarbons, by Hopper, J.D.; Polycyclic aromatic hydrocarbons: metabolism and environmental aspects, by Cripps, R.E. and Watkinson, R.J.; Microbial genetics relating to hydrocarbon degradation, by Williams, P.A.; Degradation of oil in the marine environment, by van der Linden, A.C.; Biodegradation of hydrocarbon-based products in industrial use, by Hill, E.C. A subject index completes the volume." These papers are separately abstracted in this issue of OPA. [See author index.]

[from Aquatic Sciences and Fisheries Abstracts 8(10):96. 1978]

80B-1041
MICROBIAL GENETICS RELATING TO HYDROCARBON DEGRADATION
Williams, P.A. 1978.
Developments in Biodegradation of Hydrocarbons-1, R.J. Watkinson (ed.).
London, Applied Science Publishers Ltd., 1978. p.135-164.

Biodegradation, Hydrocarbons, Microorganisms, *Genetics

"A consideration of the relevant properties of plasmids in general and the naturally occuring plasmids; the techniques of genetic engineering will be outlined together with the possible uses of newly-constructed strains in problems relating to hydrocarbon degradation. Other aspects normally considered under the broad heading of genetics, for example, the organization and regulation of relevant chromosomal genes, will only be dealt with where they relate to plasmid function."

2. Physical and Chemical Processes

80B-1042
LABORATORY STUDY OF LIQUID-PHASE CONTROLLED VOLATILIZATION RATES IN PRESENCE OF WIND WAVES
Cohen, Y., W. Cocchio and D. Mackay. 1978.
Environmental Science and Technology 12(5):553-558.

Hydrocarbons, Evaporation, Fate, Physical aspects

"Liquid-phase mass transfer coefficients (K_L) are determined by a novel method in which hydrocarbons are volatilized from aqueous solution in a laboratory wind wave tank. Implications for predicting environmental volatilization rates are discussed." [possibly oil pollution related]

80B-1043
OBSERVATIONS OF OIL BEHAVIOUR IN ICE FLOES AND THE 1977 ETHEL H. SPILL
Deslauriers, P.C. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies 1979. p.87-94. Publication No. EE-14.

Behavior, Ice, Rivers, Cold climates, Buzzards Bay, *Ethel H spill, *Hudson River

A brief discussion of the title spill into the Hudson River and some general observations on the behavior of oil spilled in ice floes - based on laboratory experiments, the Buzzards Bay spill and the Hudson River spill are presented.

80B-1044
THE DYNAMICS OF THE SPREADING OF OIL ON THE SURFACE OF WATER
Di Pietro, N.D. and R.G. Cox. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA. 1979. p.2.1-2.13.

Spreading, Oil slicks, Sea surface, Physical aspects, Behavior

The control and containment of oil slicks requires a knowledge of the physical mechanisms which cause the oil to spread on the water surface. This paper discusses the three stages in the spreading of oil on water that have been classified according to the main driving and resisting forces to the spreading, namely monolayer spreading, gravity-viscous spreading, and drag-free spreading.

D. FATE OF OIL IN THE ENVIRONMENT

2. Physical and Chemical Processes

80B-1045
TRANSPORT PROCESSES IN LAKES AND OCEANS
Gibbs, R.J. and R.P. Shaw (eds.). 1977.
Marine Science: Vol.7. R.J. Gibbs (ed.). New York, Plenum Press, 1977. 288p. Abstracts. (Eighty-Second National Meeting of the American Institute of Chemical Engineers: Symposium on Transport Processes in the Oceans, Atlantic City, 29 August-1 September 1976.)

Fate, Contamination, Lakes, Marine environment

"Hydrodynamic modeling of transport processes and the movement of dissolved and solid materials in the hydroenvironment are discussed." [possibly oil pollution related]

[from Oceanic Abstracts 15(5):78-07006. 1978]

80B-1046
WORKSHOP ON THE PHYSICAL BEHAVIOR OF OIL IN THE MARINE ENVIRONMENT HELD AT PRINCETON UNIVERSITY, PRINCETON, NEW JERSEY ON MAY 8-9, 1979.
Kerr, C.L. and C.S. Barrientos. 1979.
Department of Civil Engineering, Princeton University and Techniques Development Laboratory, National Weather Service, NOAA, 1979. 388p.

Behavior, Physical aspects, Oil slicks, Models, Predictions, Spill trajectories, Cold climates, Ice, Arctic, *Workshop proceedings

Twenty papers from the title workshop are presented, including results of experimental and simulation studies, theoretical research into spill behavior, operational forecasts of spill movement and trajectories, risk analysis, physical behavior in cold regions, and oceanographic and meteorologic aspects relevant to oil behavior. Reviewed separately in this issue of OPA are papers authored by J. Bishop, A. Blumberg, C. Cooper, P. Cornillon, N.D. Di Pietro, P. Grose, K. Hess, C.L. Kerr, D. Mackay, D. Murphy, L. Persen, D. Shonting, R. Smith, R. Stewart, D. Thomas, G. Torgrimson, N. Wagner and H. Wang. [See author index].

80B-1047
RELATIONSHIP OF MIGRATION OF NATURAL SEEP MATERIAL TO OCEANOGRAPHY OF SANTA BARBARA CHANNEL
Kolpack, R.L. 1977.
California Offshore Gas, Oil, and Tar Seeps
Sacramento, California State Lands Commission, 1977. p.226-255.

Natural seepage, Sources, Movement, Behavior, Fate, Sea surface, Physical aspects, Santa Barbara Channel, California, *Oceanography

The title study indicates that petroleum hydrocarbons from natural seeps in the Santa Barbara Channel are "transported throughout the Channel on the water surface in a pattern which is in very rough accordance with the surface water and wind circulation patterns." This report summarizes seasonal variations in meteorologic patterns, regional oceanographic conditions, indlucing surface and subsurface current configurations, and fate of seep oil on the water surface.

D. FATE OF OIL IN THE ENVIRONMENT
2. Physical and Chemical Processes

80B-1048
STUDIES OF OIL SPILL BEHAVIOUR UNDER ICE
Malcolm, J.D. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada
October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto
Institute for Environmental Studies, 1979. p.47-54. Publication No.EE-14.

Behavior, Physical aspects, Movement, Ice, Cold Climates, Canada, *Research review

The interfacial tension, contact angle, and motion of crude oil under ice are among studies conducted by the Memorial University of Newfoundland.

80B-1049
THE INTERACTION OF OIL WITH SEA ICE IN THE ARCTIC OCEAN
Martin, S. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental
Assessment of the Alaskan Continental Shelf. Volume 16. Hazards.
NOAA/ERL-AR-77-16. p.87-150.

Fate, Ice, Arctic, Spreading, Behavior

A NORCOR field experiment showed that if brine channels are present in the ice, oil rises up through the ice channels, then spreads out on and within the ice surface. "The different kinds of ice which were observed in OCS field traverses are discussed and it is shown how the ice properties change over a growing season."

[from Aquatic Sciences and Fisheries Abstracts 8(9):163. 1978]

80B-1050
PROBABLE BEHAVIOUR AND FATE OF A WINTER OIL SPILL IN THE BEAUFORT SEA
NORCOR Engineering and Research Ltd. 1977.
Canada Department of Fisheries and Environment, Report EPS 4-EC-77-5.
__ p.

Physical aspects, Behavior, Fate, Ice, Cold climates, *Beaufort Sea

Summary not available.

[from Oil, Ice and Gas-Proceedings of a Workshop, Toronto, Canada, October 10-11, 1979. University of Toronto, Institute of Environmental Studies, Publication No.EE-14. p.19. 1979]

D. FATE OF OIL IN THE ENVIRONMENT

2. Physical and Chemical Processes

80B-1051
SPREAD OF OIL-VISCOUS EFFECTS IN THE GRAVITY-INERTIAL REGIME
Ohno, M. and N. Shuto. 1978.
Coastal Engineering in Japan, No.21:173-189.

Fate, Behavior, Physical aspects, Spreading, Oil slicks

"An experimental study was made of the motion of oil spreading in a 2-dimensional flume. The influence of gravity, inertia, viscosity of the oil, and water depth is investigated, and certain features of flow are described. The effect of viscosity is not negligible in gravity-inertial regime, and the celerity and the resistance coefficient are discussed."

[from Pollution Abstracts 11(3):501. 1980]

80B-1052
TRANSPORT AND BEHAVIOUR OF A PRUDHOE BAY OIL SPILL
Pritchard, R.S. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies 1979. p.103-110. Publication No.EE-14.

Behavior, Fate, Movement, Ice, Prudhoe Bay, Alaska

"The objective of the work discussed here is to determine the locations to which oil spilled in or under the ice cover near Prudhoe Bay, Alaska, would be transported, and to determine the behavior of the oil as the ice cover moves and deforms."

80B-1053
ASPECTS OF OIL-ICE INTERACTION SUBSEQUENT TO THE KURDISTAN SPILL
Reimer, E. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto, Institute for Environmental Studies 1979. p.75-86. Publication No.EE-14.

Behavior, Physical aspects, Ice, Contamination, Canada, *Kurdistan spill

The predominant oil-ice interactions resulting from contaminated ice along the southeastern Cape Breton shore, which were studied by a team of observers from C-CORE (Centre for Cold Ocean Resources Engineering) are reviewed in this paper.

80B-1054
SUMMARY OF AMOP OIL-ICE-GAS INTERACTION STUDIES
Thornton, D.E. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada
October 10 and 11, 1979
D. Mackay and S. Paterman (eds.). Ontario, Canada, University of
Toronto, Institute for Environmental Studies, 1979. p.3-7.
Publication No.EE-14.

Behavior, Physical effects, Crude oil, Ice, Arctic, Seawater

The title summary includes the interaction of crude oil and natural gas with laboratory-grown saline ice, the configuration of oil and gas under ice, a field study of the permeability of multiyear ice to sea water with implications on its permeability to oil, the interaction of crude oil and multi-year ice, and the interaction of the Kurdistan Bunker-C fuel with pack ice.

80B-1055
THE DISPOSITION OF GAS/OIL MIXTURES TRAPPED UNDER ICE
Topham, D.R. 1979.
Oil, Ice and Gas-Proceedings of a Workshop Held in Toronto, Canada,
October 10 and 11, 1979.
D. Mackay and S. Paterson (eds.) Ontario, Canada, University of Toronto,
Institute for Environmental Studies, 1979. p.55-73. Publication No.EE-14.

Physical aspects, Fate, Behavior, Ice

The characteristics and mathematical results of measuring the interfacial tension of two liquids by examining the sessile drop/lens combination, the double sessile drop, and the ice/oil/water/gas system are presented.

80B-1056
THE EFFECT OF TURBULENCE ON OIL EMULSIFICATION
Wang, H. and C.P. Huang. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment,
Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr
and C.S. Barrientos (organizers). Department of Civil Engineering,
Princeton University, and Techniques Development Laboratory, National
Weather Service, NOAA, 1979. p.1.81-1.100.

Behavior, Emulsification, Crude oil, Physical effects, *Turbulence

Laboratory experiments are described which were used to investigate the effect of turbulence on the extent of oil emulsification. Two modes of experiments were conducted: batch reactor and circulation tank. In the laboratory, mixing at over 1000 rpm was necessary to effectively disperse oil. Converted to wind speed, this is equivalent to about 10 cm/sec water velocity, a speed easily attainable in the real oceanic environment. Thus most crude oils are readily emulsifiable.

D. FATE OF OIL IN THE ENVIRONMENT

2. Physical and Chemical Processes

80B-1057
RAPID WEATHERING PROCESSES OF FUEL OIL IN NATURAL WATERS: ANALYSES AND INTERPRETATIONS
Zurcher, F. and M. Thuer. 1978.
Environmental Science and Technology 12(7):838-843.

Physical aspects, Fate, Weathering, Fuel oil, Groundwater

Model experiments were utilized to study fate determining steps of weathering petroleum in the aquatic environment. Differing weathering processes were noted in No. 2 fuel oil, depending on turbulence and the level of suspended solids in water. Fractionation of the original oil mixture occurred; the same fractionation pattern was observed for a groundwater oil spill, although the oil was altered biochemically.

[from Aquatic Sciences and Fisheries Abstracts 9(2):218. 1979]

3. Models, Simulations and Predictions

80B-1058
BEAUFORT SEA STORM SURGES MAY THREATEN OIL OPERATIONS [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(4):44-45.

Predictions, Oil spills, Movement, Offshore, Development, Beaufort Sea, *Storm surges

USGS researchers studied a major 1970 Beaufort Sea storm which flooded the coast up to five kilometers inland, and noted that the "likelihood of an oil spill would reach a peak during such a surge and any released oil might spread up to five km inland."

80B-1059
COMBATING OIL POLLUTION WITH THE AID OF A COMPUTER [NEWS BRIEF]
Anon. 1979.
Environmental Pollution Management 9(1):7-11.

Models, Simulations, Oil industry, Oil slicks, Movement, Spreading, Evaporation, Behavior

"A computer system, Sliktrak, developed by the Oil Industry Exploration and Production Forum, simulates the creation of an oil spill and predicts its movement and dispersal, considering wind, evaporation, mixing with the sea, and currents and making it possible to predict how much oil will reach a particular coastline from any given oil well blowout or spillage."

[from Pollution Abstracts 11(1):35. 1980]

D. FATE OF OIL IN THE ENVIRONMENT

3. Models, Simulations and Predictions

80B-1060
GETTING TO KNOW YOUR OIL SLICK [NEWS BRIEF]
Anon. 1977.
Offshore Services 10(8):46.

Simulations, Oil slicks, Blowouts, Movement, Spreading, North Sea, *Sliktrak

Using the Shell researched Sliktrak-a computerized system for estimating the extent of damage that could be expected after a blow-out in the North Sea- the following conclusions have been reached: 1) Less than 5% of the total spill from any North Sea blowout is likely to reach shore; 2) it would take between one and three weeks to arrive; 3) the oil would not arrive all at once but in manageable quantities; 4) total costs for pollution damage would not exceed $30 million and this figure has now been accepted as the practical limit. The system has, over the last two years, been made available free of charge to governments and all legitimately interested parties.

[from Aquatic Sciences and Fisheries Abstracts 8(12):161. 1978]

80B-1061
IXTOC OIL AGAIN THREATENS US [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(3):59.

Ixtoc 1 blowout, Fate, Gulf of Mexico, Coasts, Beaches, Spill trajectories, Models

Oil from the Petroleos Mexicanos (PEMEX) 'Ixtoc I' could once again pollute American beaches when the Gulf of Mexico currents reverse sometime in February. According to a NOAA representative the latest spill trajectory model indicates that oil again may reach Tampico, Mexico in February and US beaches by April 1980.

80B-1062
OFFSHORE OIL SPILL RECOVERY [NEWS BRIEF]
Anon. 1978.
Norwegian Maritime Research 6(2):48.

Simulations, Spill response, Contingency planning, Equipment, Information systems, Personnel training

The title research project produced an EDP-program for simulation of offshore oil spill recovery operations; it is to be used for analysis of contingency plands as well as for equipment comparisons. Started in late 1975 and operative in 1977, its first task was to evaluate actual readiness, thus pinpointing weak areas in recovery capabilities. User-control of the simulated operation is expected to be improved by converting the system to an interactive graphic terminal, expanding its use for educational purposes.

[from Aquatic Sciences and Fisheries Abstracts 9(5):128. 1979]

80B-1063
OILSIM-OIL SPILL SIMULATION SYSTEM [NEWS BRIEF]
Anon. 1978.
Norwegian Maritime Research 6(2):41.

Simulations, Oil spills, OCS, Oil industry, Physical aspects, Drift, Sea surface

The objective of the title research project is the development of a computer program capable of projecting the consequences of oil spills at various sites and under specific weather conditions. Initiated in 1976 by the Continental Shelf Institute (IKU), Det norske Veritas (DnV), Saga Petroleum and Statoil, it was operative in 1977 and had been improved through 1979. The program applies wind, wave, current and temperature data to various oil spill parameters - evaporation curves, changes in viscosity, surface tension and so on: visual output covers spill area, drifted distance, surface amounts of oil, dissipation figures, and ppm values. Output is generated both on four-color TV screens and a line-printer.

[from Aquatic Sciences and Fisheries Abstracts 9(5):128. 1979]

80B-1064
OILSPILL RISK ANALYSIS COMPLETED FOR KODIAK ISLAND LEASE AREA [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(7):47.

Predictions, Risk analysis, Gulf of Alaska, Oil-gas leasing, OCS, *Kodiak Island lease area

The US Geological Survey has completed a risk analysis study for the title region in the Western Gulf of Alaska. The study concludes that if oil is found "there is a 65% probability of one or more major oil spills larger than 1000 barrels occurring some time during the 30-year working life of the lease area." Chances of oil washing ashore range from 37 to 80 percent. An Oil Spill Risk Analysis for the Kodiak Island Outer Continental Shelf Lease Area, USGS Open File Report 80-175, is available from the Open-File Services Section, Branch of Distribution, USGS, Box 25425, Federal Center, Denver, CO 80225.

80B-1065
NUMERICAL SIMULATION OF THE MOVEMENT AND DISPERSION OF OIL SLICKS IN THE UPPER ST. LAWRENCE ESTUARY: PRELIMINARY RESULTS
Aubin, F., M.I. El-Sabh and T.S. Murty. 1979.
Naturaliste Canadien 106(1):37-44.

Simulations, Movement, Oil slicks, St. Lawrence River, Estuaries, Spill trajectories

A numerical model which computes the trajectory of an oil slick due to tidal currents, winds and random variations in the wind field was developed. Two field experiments conducted in Nov. 1972 showed that wind persistence or duration was a primary factor in oil slick dispersion.

[from Pollution Abstracts 11(2):257. 1980]

80B-1066

THE POTENTIAL IMPACT OF THREE DIMENSIONAL CIRCULATION MODELING ON OIL SPILL FORECASTING

Blumberg, A. F. and G.L. Mellor. 1979.

Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.6.1-6.18.

Predictions, Models, Oil slicks, Behavior, Coastal waters, Estuaries, *Circulation modeling

Results of a variety of numerial experiments with an advanced three-dimensional coastal ocean and estuarine model are discussed. Vertical and regional horizontal structure of the circulation in predicted surface currents are found to be important. "This new model...is a valuable technique for forecasting the behavior of surface oil slicks."

80B-1067

MODELING NEAR SURFACE CURRENTS

Cooper, C. and B.R. Pearce. 1979.

Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.6.43-6.61.

Predictions, Sea surface, Spill trajectories, *Near surface currents

This paper discusses the development of a simple efficient method for predicting vertical and lateral variations in near surface currents. A three-dimensional velocity model can assist in predicting the trajectory of spilled oil.

80B-1068
IMPACT ASSESSMENT IN OIL SPILL MODELING
Cornillon, P., M. Spaulding and M. Reed. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.4.1-4.31.

Models, Simulations, Environmental effects, Fisheries, Georges Bank, Behavior

This paper assesses the current status of oil spill modeling. Included is a review of current model types relative to their applications, followed by a description of the University of Rhode Island oil spill-fisheries interaction model and its application to a simulated Georges Bank oil spill. "The results of this simulation are used to highlight the deficiencies of our model and of most other models that we have reviewed."

80B-1069
A NUMERICAL MODEL FOR A COASTAL DISCHARGE [ENGLISH SUMMARY]
Font, J. and A. Cruzado. 1977.
Investigacion Pesquera 41(3):647-654.

Simulations, Fate, Coastal waters, *Pollutant diffusion

"A simulation model is presented for the diffusion within the sea of a dissolved pollutant supplied from a coastal source by a water discharge of constant flow rate. The steady state solution for some standard conditions was obtained, and a sensibility analysis was performed by varying in 2 orders of magnitude 4 parameters representing the advection and diffusion characteristics of the discharge. The model has a high stability and shows that the pollution effect has been reduced to 10% 1 km from shore." [possibly oil pollution related]

[from Oceanic Abstracts 15(5):78-6650. 1978]

80B-1070
NUMERICAL STUDIES OF ALASKAN REGION
Galt, J.A., et al. 1977.
U.S. National Oceanic and Atmospheric Administration, Environmental Assessment of the Alaskan Continental Shelf. Volume 14. Transport. Report NOAA/ERL-AR-77-1r. p.329-409.

Models, Statistical analysis, Spill trajectories, Coastal waters, Coasts, Gulf of Alaska

D. FATE OF OIL IN THE ENVIRONMENT
3. Models, Simulations and Predictions

"A synopsis of modeling efforts in support of OCSEAP work around Alaska is presented. Included are program development for an advanced spill model for use anywhere along the Alaska coast, diagnostic model studies of ocean surface currents around Kodiak, advection trajectory model studies in the Gulf of Alaska, a coastal marine meteorological model applied along the southeast Alaskan coast, a study of the circulation of the Bering Sea, and a report on the status of computer hardware and software in support of the modeling efforts."

[from Aquatic Sciences and Fisheries Abstracts 8(9):145. 1978]

80B-1071
PROBABLE MOVEMENTS OF A HYPOTHETICAL OIL PATCH FROM THE BOMBAY HIGH REGION
Gouveia, A.D. and P G. Kurup. 1977.
Indian Journal Marine Science 6(2):118-121.

Movement, Drift, Spill trajectories, Coasts, Oil slicks, India

Potential drift trajectories of accidental oil spills are presented with both theoretical and empirical results applied to mean wind and current data. A movement chart shows that a threat to the coastline is mainly from May to September.

[from Aquatic Sciences and Fisheries Abstracts 8(9):142. 1978]

80B-1072
A PRELIMINARY MODEL TO PREDICT THE THICKNESS DISTRIBUTION OF SPILLED OIL
Grose, P.L. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.1.1-1.16.

Models, Predictions, Distribution, Oil slicks, *Thickness

A preliminary model to predict the thickness distribution of spilled oil as a function of environmental conditions and oil composition is presented. Verification and limitations in applicability of the model are discussed.

80B-1073
THE NATIONAL WEATHER SERVICE OIL SPILL MOTION FORECASTING PROGRAM
Hess, K.W. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.3.11-3.22.

Predictions, Behavior, Movement, Distribution, Sea surface

The title model consists of three major segments, relies heavily on finite-difference techniques, and is driven by output of NWS atmospheric models. "The three separate parts are: (1) a model of the atmosphere's near-surface planetary boundary layer, (2) a dynamic model of the upper mixed-layer of the ocean, giving surface currents, and (3) a dynamic model of two-dimensional, variable thickness oil distribution on the sea."

80B-1074
MATHMATICAL MODELS IN WATER POLLUTION CONTROL
James, A. (ed.). 1978.
Chichester, UK, John Wiley & Sons Ltd., 1978. 420p.

Models, Marine environment, Contamination, Pollution control, Estuaries, Dispersion

Summary not available.

[from Underwater Information Bulletin 10(6):48. 1978]

80B-1075
DEVELOPMENT OF A GENERAL NUMERICAL MODEL TO FORECAST THE MOTION OF OIL ON THE SURFACE OF WATER
Kerr, C.L. 1979.
Princeton, New Jersey, Princeton University, Department of Civil Engineering, Research Report #79-WR-4. __ p.

Predictions, Models, Sea surface, Oil slicks, Behavior, Movement

Summary not availble.

[from Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.2.35.].

80B-1076
DEVELOPMENT OF THE GENERAL VERTICALLY AVERAGED HYDRODYNAMIC EQUATIONS GOVERNING THE MOTION OF OIL ON THE SURFACE OF WATER
Kerr, C.L. 1978.
Princeton, New Jersey, Princeton University, Department of Civil Engineering, Research Report #78-WR-6. __ p.

Models, Movement, Behavior, Spreading, Sea surface, Oil slicks, *Hydrodynamic equations [Summary not available]

[from Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.2-35.].

80B-1077

EXPERIMENTAL STUDIES OF DISPERSION AND EMULSION FORMATION FROM OIL SLICKS

Mackay, D., I. Buist, R. Mascarenhas and S. Paterson. 1979.

Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton Univeristy and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.1.17-1.40.

Models, Predictions, Emulsions, Dispersion, Oil slicks, Sea surface, *Water column

Laboratory scale experiments are described and supportive mathematical models are presented which investigated water-in-oil emulsions formation and wave induced dispersion of crude oil slicks into the water column. A mathematical model is presented which incorporates the major physical phenomena responsible for dispersion and which predicts oil concentrations in the water column after oil slick dispersion by waves.

80B-1078

OIL SPILL FORECASTING-A USER'S VIEWPOINT

Murphy, D.L. and D.L. Thompson. 1979.

Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.3.23-3.42.

Models, Predictions, Spill trajectories, Spill response, *Operational forecast model

This paper discusses, from a user perspective, the necessary characteristics and requirements of an operational forecast model, also known as the real-time spill trajectory model. This model is particularly useful to the on-scene commander who uses the forecast to hire and deploy containment and cleanup resources, initiate countermeasures, and obtain samples for spill identification.

80B-1079

THE MIXING OF OIL SPILLS INTO THE SEA BY BREAKING WAVES

Naess, A. 1980.

Journal of Petroleum Technology 32(6):1090.

Models, Physical aspects, Dispersions, Oil spills, Sea surface, *Breaking waves

"An important pollution-control problem on the high seas is the mixing of an oil spill into the sea caused by breaking waves. This paper presents a theoretical model for determining the amount of oil mixed into the sea by breaking waves. The model is based primarily on probabilistic methods, with experimental observations and data as the foundation."

D. FATE OF OIL IN THE ENVIRONMENT

3. Models, Simulations and Predictions

80B-1080
ON THE COMPUTATION OF COMPACTNESS OF ICE FOR THE STUDY OF DYNAMICS OF OIL SPILLS IN THE ICE INFESTED WATERS
Nevalla, V.R. 1979.
Workshop on the Physical Behavior of Oil inthe Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C. L. Kerr and C. S. Barrientos (organizers). Department of Civil Engineering, Princeton Univeristy, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.5.1-5.16.

To assist in the study of dynamics of oil spills in ice infested waters, a simple method for calculating ice compactness is decribed and the computed compactness is compared with daily observed ice cover distribution.

80B-1081
OIL SPILL CONTROL SYSTEM
[Nippon Kokan K.K.] 1977.
Petroleum Engineering International 49(8):16.

Simulations, Pollution prevention, Tankers, Ships, Oil transfer

Oil spills during tanker loading and unloading can be avoided if personnel are trained to react properly. Described is a computerized training program that can simulate a 30-h unloading operation in one hour.

80B-1082
WIND WAVE AND TURBULENCE OBSERVATIONS RELATED TO OIL MIXING PARAMETERS
Shonting, D., A. Petrillo, and P. Temple. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersy, May 8-8, 1979. C. L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.6.63-6.90.

Models, Oil slicks, Behavior, Dispersion, Emulsification, USN, USCG

Described are observations and results of the Wave and Turbulence Observation Program (WAVTOP) developed by the US Navy for the US Coast Guard. WAVTOP is aimed at providing field and numerical data for developing models of oil slick behavior.

80B-1083
A RESEARCH PROGRAM TO STUDY WAVE CONTRIBUTIONS TO OIL SPILL DYNAMICS
Stewart, R.J. and C. Mobley. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.1.63-1.81.

Models, Simulations, Behavior, Physical effects, Fate, Oil spills

D. FATE OF OIL IN THE ENVIRONMENT

3. Models, Simulations and Predictions

Current and previous oil spill models are evaluated, current research needs are identified, and a numerical model which forms aprt of the Pacific Marine Environmental Research Laboratory program is described.

80B-1084
U.S. COAST GUARD ARCTIC OIL SPILL RESEARCH PROGRAM
Tebeau, P.A. and I.M. Lissauer. 1979.
Oil, Ice, and Gas-Proceedings of a Workshop Held in Toronto, Canada, October 10 and 11, 1979. D. Mackay and S. Paterson (eds.). Ontario, Canada, University of Toronto, Institute for Environmental Studies, 1979. p.111-128. Publication No. EE-14.

Models, Predictions, Movement, Ice, Information systems, USCG, Contingency planning, Cold climates

The USCG Research and Development Center is investigating the oil-in-ice problem to develop models for predicting the transport of oil spills in ice, and to catalog data needed in planning effective spill response.

80B-1085
OIL MOVEMENT IN THE ICE COVERED BEAUFORT AND CHUKCHI SEAS
Thomas, D.R. and R.S. Pritchard. 1979.
The Physical Behavior of Oil in the Marine Environment, Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos, (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.5.17-5.31.

Predictions, Movement, Behavior, Ice, Spill trajectories, Beaufort Sea, *Chukchi Sea

Basedon 25 years of historical atmospheric data, monthly means and variation of free drift ice trajectories are presented for the title areas. These results are useful for predicting the range of movement of oil contaminated ice.

80B-1086
AN ON SCENE MODEL FOR POLLUTANT TRAJECTORY SIMULATIONS
Torgrimson, G.M. and J.A. Galt. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.3.43-3.66.

Models, Predictions, Simulations, Spill trajectories, Behavior, Environmental effects, Coasts, NOAA

NOAA's Pacific Marine Environmental Laboratory has developed an interactive real-time spill trajectory model, the On Scene Spill Model (OSSM), which is useful as an environmental assessment tool to predict pollutant trajectories and coastal impact areas, using hypothetical spill data.

D. FATE OF OIL IN THE ENVIRONMENT

3. Models, Simulations and Predictions

80B-1087
AN OILSPILL RISK ANALYSIS FOR THE KODIAK ISLAND OUTER CONTINENTAL SHELF LEASE AREA
US Geological Survey. 1980.
USGS Open File Report 80-175. ___p.

Risk analysis, Predictions, Oil-gas leasing, OCS, Gulf of Alaska, *Kodiak Island lease area

This risk analysis concludes that if oil is found "there is a 65% probability of one or more major oil spills larger than 1,000 barrels occruing sometime during the 30-year working life of the lease area." Chances of oil washing ashore are estimated at 37-80%, and the combined probablility of a spill and oil reaching shore within 30 days is about 43% over the 30-year period. The report is available from the Open-File Service Section, Branch of Distribution, USGS, Box 25425, Federal Center, CO 80225.

[from Sea Technology 21(7):47. 1980]

80B-1088
SIMILARITY THEORY APPLIED TO SURFACE WINDS NAD OIL SLICK TRANSPORT
Wagner, N.K. and E.J. Fredricksen. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.6.91-6.100.

Simulations, Models, Movement, Spreading, Oil slicks, Sea surface, Argo Merchant spill, *Surface currents

Predictions of oil spill movement can be obtained from appropriate atmospheric boundary layer, air-ocean interface, and oceanic models. This paper describes a planetary boundary layer and wind drive surface current model and compares predicted values with observational data from the Argo Merchant spill of December 1976. It is concluded that the model is useful in simulating the oil slick centroid during movement across the sea.

4. General Fate of Oil

80B-1089
IXTOC OIL VANISHES [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(6):149.

Detection, Ixtoc 1 blowout, NOAA, USCG, Gulf of Mexico, Coasts, *Research funds

D. FATE OF OIL IN THE ENVIRONMENT

4. General Fate of Oil

Over flights by the U.S. Coast Guard of Mexican and U.S. coastal waters detected no visible signs of Ixtoc I oil as far as 50 km offshore and as far south as Tampico, Mexico. Even though most of the 140 million gallons of spilled oil has not been accounted for, the U.S. Congress announced that they will not provide funding for the NOAA damage assessment plan for lack of 1981-82 funds.

80B-1090
PETROLEUM AGGREGATES IN THE HYPONEUSTAL LAYER OF THE EAST ATLANTIC [ENGLISH SUMMARY]
Benjitskij, A.G., L.V. Tret'yakova and E.A. Kolesnikova. 1978.
Gidrobiologicheskii Zhurnal 14(3):53-56.

Crude oil, Tar, Weathering, Distribution, Biological effects, Atlantic Ocean, *Neustonic periphyton

"On the basis of material collected during the period from December 18, 1976 to March 4, 1977 data are presented on the distribution of petroleum lumps in the 0-25 cm layer of the area from north of Canary Is. (30°N) to the equator. The concentration of petroleum lumps was found to decrease from north to south. Peculiar neustonic periphyton found on the surface of petroleum lumps is described and the occurrence of nematodes inside the lumps is reported for the first time."

[from Aquatic Sciences and Fisheries Abstracts 9(2):215. 1979]

80B-1091
A PROPOSED CLIMATOLOGICAL OIL SPILL ATLAS
Bishop, J.M. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.3.1-3.11.

Information systems, Guidelines, Manuals, Spill response, Predictions, Models, Spill trajectories, *Climatological atlas

The title atlas would aid in operational spill trajectory forecasting, in oil spill modeling, and in spill response decisionmaking. The types of data to be included in such an atlas would be oceanographic, climatologic information on fate of oil at sea, regional climatological trajectory risk charts, charts of biological and recreational resources, "rule of thumb" oil trajectory estimates, and persons to contact for specific help on various questions concerning the spill.

D. FATE OF OIL IN THE ENVIRONMENT

4. General Fate of Oil

80B-1092

LIGHT HYDROCARBONS IN MARINE SEDIMENTS
Boyd, B.B. 1978.
Texas A and M University, Ph.D. Dissertation. 154p.

Distribution, Concentrations, Hydrocarbons, Sediments

Summary not available.

[from Chemical Abstracts 89(22): #181987h. 1978]

80B-1093

CALIFORNIA OFFSHORE GAS, OIL, AND TAR SEEPS
California State Lands Commission. 1977.
Sacramento, California State Lands Commission, 1977. xxiii + 449p.

Natural seepage, Distribution, Sources, Tar, Hydrocarbons, Chemical analysis, Fate, Santa Barbara Channel, California

This report contains papers on the occurrence, distribution, chemistry, weathering, oceanography, detection, monitoring and remote sensing of oil seeps on the continental shelves off Southern California. About 900 bibliographic citations of relevant literature are included. Papers by P.J. Fischer, T.L. Henyey et al., W.E. Reed et al., R.L. Kolpack, J.E. Estes et al., S.P. Kraus et al., and E.E. Welday are abstracted separately in this issue of Oil Pollution Abstracts. [see author index]

80B-1094

CALIFORNIA OFFSHORE GAS, OIL, AND TAR SEEPS-EXECUTIVE SUMMARY
Everitts, D.J., C.F. Eaton, R.G. Paul, and E.E. Welday. 1977.
Sacramento, California State Lands Commission, 1977. p.i-xxiii.

Natural seepage, Tar, Crude oil, Chemical analysis, Distribution, Sources, Biological effects, Fate, Offshore, Santa Barbara Channel, California

The title report deals with the over 2000 natural oil and gas seepage zones located in the California Offshore area, primarily along the northern most part of the Santa Barbara Channel, between the Rincon to Santa Barbara area, Coal Oil Point, and Point Conception. This summary describes the extent of seepage, the geology, oceanography, and seismicity of the region, biological and chemical aspects, and addresses the problem of natural seepage vs. pollution from oil development activity.

80B-1095
NATURAL GAS AND OIL SEEPS, SANTA BARBARA BASIN, CALIFORNIA
Fischer, P.J. 1977.
California Offshore Gas, Oil, and Tar Seeps.
Sacramento, California State Lands Commission, 1977. p.1-62.

Natural seepage, Tar, Coastal waters, OCS, Distribution, Sources, Fate, Santa Barbara Channel, California *Geology

This paper reviews the regional and specific geologic setting for natural oil and gas seeps in coastal waters of the Santa Barbara Channel, California. Discussed are seep trends, their areal distribution, activity, fate of seep oil and tar, their effects on local oil pollution, and their relationship to presently ongoing tectonic activity.

80B-1096
COASTAL POLLUTION OF THE MEDITERRANEAN
Jenkins, S.H. 1980.
Marine Pollution Bulletin 11(1):6-10.

Sources, Coastal waters, Contamination, Mediterranean Sea, Ballast

As a study of the sources and amounts of pollution entering the Mediterranean this article discusses a variety of topics including causes of pollution, the effects of pollution ranging from ecological to health and aesthetics, and methods for reducing pollution. The problem of ballast water and oil spills are also addressed.

80B-1097
TRANSFER AND TRANSFORMATION OF POLLUTANTS BY BIOLOGICAL PROCESSES
Wilson, K.E. 1978.
Lectures Presented at the Fifth FAO/SIDA Workshop on Aquatic Pollution in Relation to Protection of Living Resources. Scientific and Administrative Basis for Management Measures. Rome, FAO, 1978. p.260-275. Report ISBN92-5-100601-6; FAO TF-RAS-34-(SWE)-Suppl-1.

Sources, Oil transfer, Movement, Pollution control, Marine environment

The paper discusses transport of pollutants in the atmosphere, lithosphere and hydrosphere. Transfer processes and control measures are described. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(5):133. 1979]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1098
BIOAVAILABILITY OF HYDROCARBONS AND HEAVY METALS TO MARINE DETRITIVORES FROM OIL-IMPACTED SEDIMENTS
Anderson, J.W., G. Rosesijadi and E.A. Crecelius. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.130-148. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Hydrocarbons, Sediments, Food web, Contamination, Uptake, Benthos, *Marine detritivores

The title studies were conducted to assess potential damage to benthic organisms and to determine contaminant availability to marine food-webs and man. Evidence seems to indicate that "hydrocarbons bound to sediment particles are not directly available to deposit/detritus-feeding organisms." A tissue accumulation pattern does appear to be associated with the molecular weight of the petroleum hydrocarbon, probably dependent upon relative partitioning coefficients.

[from Aquatic Sciences and Fisheries Abstracts 9(4):190. 1979]

80B-1099
INFLUENCE OF PETROLEUM ON EGG FORMATION AND EMBRYONIC DEVELOPMENT IN SEABIRDS
Ainley, D.G. and C.R. Grau. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.188-198. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Birds, Fuel oil, Biological effects, Development, *Seabirds, *Egg formation

Females of breeding paris of Cassin's auklets were dosed with bunker C oil or controls and egg production, hatching success, and fledgling success were determined. Attempts to dose western gulls were unsuccessful.

[from Aquatic Sciences and Fisheries Abstracts 9(4):191. 1979]

80B-1100
INTERACTIVE EFFECTS OF RESIDUES OF HYDROCARBONS, CHLORINATED HYDROCARBONS, AND HEAVY METALS ON THE METABOLISM AND BIOACCUMULATION OF PETROLEUM HYDROCARBONS IN MARINE FISH
Gruger, E.H., Jr., J.W. Hawkes and D.C. Malins. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.250-269. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Hydrocarbons, PAH, Fish, Metabolism, Uptake, *Salmon

Experiments indicate that chlorobiphenyls may either enhance or retard the normal biotransformations of PAHs in exposed fish (hepatic microsomal AHH system responses in chinook and coho salmon). Morphological changes appear less severe when the chemical classes are separately administered. Synergistic action was apparent.

[from Aquatic Sciences and Fisheries Abstracts 9(4):192. 1979]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1101
MORPHOLOGY
Hawkes, J.W. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.).
Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.87-92.
Report NOAA-TM-ERl-OCSEAP-1. NOAA Technical Memorandum.

Crude oil, WSF, Fish, Sublethal effects, Chronic effects, Metabolism, *Morphological changes

"The two major objectives are to identify the effects of petroleum on fish at the cellular level and to establish which tissues show the most obvious and repeatable structural alterations." The effects of Prudhoe Bay crude oil and its WSF are assessed in pelagic and demersal species, and on adult and young.

[from Aquatic Sciences and Fisheries Abstracts 9(4):190. 1979]

80B-1102
PHYSIOLOGICAL AND BEHAVIORAL EFFECTS
Hodgins, H.O. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.).
Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.72-86.
Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Sublethal effects, Behavior, Fish, OCS, Development, Pacific Ocean

Studies designed as laboratory experiments - with the exception of field studies of salmon homing - evaluated effects of sublethal petroleum exposure on species native to the North Pacific Ocean under natural water quality and temperature conditions. Results suggest that in certain instances heavy exposures have little effect on physiology; whereas, in other cases, severe effects may result from light to moderate exposures.

[from Aquatic Sciences and Fisheries Abstracts 9(4):190. 1979]

80B-1103
THE BACTERIAL COMMUNITY COMPOSITION OF AN ACTIVE OIL FIELD IN THE NORTHWESTERN GULF OF MEXICO
Hollaway, S.L, G.M. Faw and R.K. Sizemore. 1980.
Marine Pollution Bulletin 11(6):153-156.

Bacteria, Oil fields, OCS, Gulf of Mexico, Platforms, Toxicity, Sampling, *Pseudomonas sp.

The bacterial composition of the water column around two oil production platforms and a control site was examined during three seasons using three water depth sampling stations. The genus Pseudomonas predominated at the oil field stations and the control. Enumeration and biomass estimation, taxonomic and physiological diversity, and toxicity of oil field products are examined.

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1104
EFFECTS OF OILING ON TEMPERATURE REGULATION IN SEA OTTERS
Kooyman, G. and D. Costa. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.216-221. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Metabolism, Marine mammals, Crude oil, *Sea otters

In study of two otters conducted at Scripps Institution of Oceanography, the normal metabolic rates were determined prior to a series of metabolic runs. Prudhoe crude oil was applied to one animal in two doses of 38ml and 60ml. The otter's average metabolic rate increased 24% and 60% respectively. Two weeks later, flood tests uncovered an unusually high white blood cell count in the dosed otter.

[from Aquatic Sciences and Fisheries Abstracts 9(4):191. 1979]

80B-1105
OVERVIEW
Malins, D.C. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.92-105. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Marine organisms, Invertebrates, Uptake, Concentrations, Aromatic hydrocarbons, Toxicity

Results of a number of studies indicate that many marine invertebrates especially larval forms, are highly susceptible to petroleum pollution. Bioconcentration of aromatic hydrocarbons in these larval forms, and various life stages and activities are associated with sensitivity to low-level hydrocarbon contamination in the water. Slight elevations in toxic metal concentrations can alter the metabolism of aromatic hydrocarbons. See papers by Hawkes, J.W.; Hodgins, H.O.; McCain, B.B.; Malins, D.C.; Rice, S.D.; Varanasi, U.; and Wolfe, D.A. in this issue of OPA. [See author index]

80B-1106
SUBLETHAL EFFECTS OF PETROLEUM HYDROCARBONS AND TRACE METALS INCLUDING BIOTRANSFORMATIONS, AS REFLECTED BY MORPHOLOGICAL, PHYSIOLOGICAL, PATHOLOGICAL, AND BEHAVIORAL INDICES
Malins, D.C., E.H. Gruger, H.O. Hodgins, N.L. Karrick and D.D. Weber. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.25-40. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Behavior, Uptake, Metabolism, Sublethal effects, Fish, *Biotransformation, *Trace metal effects

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

A significant body of evidence suggests that aromatic hydrocarbons convert rapidly to metabolites in pelagic and demersal fish and in invertebrate larval forms. The tendency of starry flounder to accumulate high proportions of metabolites in skin is related to their known susceptibility to skin lesions. "The findings to date imply that the pelagic specis may be less susceptible...than the demersal species", although more organisms must be studies to verify this hypothesis.

[from Aquatic Sciences and Fisheries Abstracts 9(4):189. 1979]

80B-1107

THE EFFECTS OF ALASKAN CRUDE OIL ON FLATFISH, AND THE PREVALENCE OF FISH PATHOLOGY IN ALASKAN MARINE WATERS
McCain, B.B. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.54-71. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Fish, Crude oil, Chronic effects, Contamination, Sediments, Coastal waters, OCS, Bering Sea, Alaska

Data from two separate studies are presented. One study concerns long-term pathological effects of exposing flatfish to contaminated sediments, and involved a variety of disciplines. The other deals with the prevalence, distribution, and pathology of disease of demersal fishes in the Bering Sea, Gulf of Alaska, Norton Sound, and Chukchi Sea. The studies indicate the Alaskan OCS fish population shows significant disease frequency.

[from Aquatic Sciences and Fisheries Abstracts 9(4):189. 1979]

80B-1108

MICROBIAL ACTIVITY AND CRUDE OIL-MICROBIAL INTERACTIONS IN WATER AND SEDIMENTS
Morita, R.Y., R.P. Griffiths, T.M. McNamara and S.E. Steven. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.167-187. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Microorganisms, Biodegradation, Crude oil, Uptake, Seawater, Sediments, Cold climates

The title research deals mainly with "direct counts of the microbial population (epi-fluorescent counts), heterotrophic activity at in situ temperature, and laboratory studies [of] microbial functions at low temperature in relation to petroleum degradation...nitrogen fixation, chitinase activity, etc. in the presence and absence of crude oil."

[from Aquatic Sciences and Fisheries Abstracts 9(4):191. 1979]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1109
THE EFFECTS OF PETROLEUM HYDROCARBONS ON CHEMORECEPTION IN DUNGENESS CRAB (CANCER MAGISTER)
Olla, B.L. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.244-249. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Hydrocarbons, Seawater, Bioindicators, Crustaceans, *Cancer magister, *Chemoreception

Many behaviors rely heavily upon chemoreception. It was found in the title study that antennular flicking rate changes, indicating that blue crabs can detect naphthalene and methylnaphthalene in seawater solution. Implications are that the crab may prove to be a valuable bioindicator.

[from Aquatic Sciences and Fisheries Abstracts 9(4):192. 1979]

80B-1110
EFFECTS OF PETROLEUM EXPOSURE ON THE BREEDING ECOLOGY OF THE GULF OF ALASKA HERRING GULL GROUP (LARUS ARGENTATUS X LARUS GLAUCESCENS)
Patten, S.M., Jr. and L.R. Patten. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.199-215. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Crude oil, Mortality, Sublethal effects, Birds, Gulf of Alaska, *Herring gulls

Conclusions from the title experiment are the following: very small amounts of North Slope Crude Oil exposes gull eggs to high embryonic mortality; resistance to petroleum increases with the duration of incubation; and mineral oil in equivalent doses causes no significant mortality.

[from Aquatic Sciences and Fisheries Abstracts 9(4):191. 1979]

80B-1111
DRILLING AND TOXICITY
Ray, J.P. 1978.
Ecolibrium 7(3):8-11.

Drilling, Biological effects, Toxicity

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:94, #4335. 1979]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1112

ACUTE AND CHRONIC TOXICITY, UPTAKE AND DEPURATION, AND SUBLETHAL RESPONSE OF ALASKA MARINE ORGANISMS TO PETROLEUM HYDROCARBONS
Rice, S.D., J.F. Karinen and S. Korn. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.11-24. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Acute effects, Chronic effects, Toxicity, Uptake, Depuration, Sublethal effects, Marine organisms, Alaska, *OCSEAP program

This report describes progress associated with the OCSEAP-funded portion of the Auke Bay Laboratory studies on oil effects (the portion from the last 2 months of FY75.) Two basic themes are dealt with: toxicity challenge - identification of sensitive species and life stages as well as factors affecting or most responsible for toxicity - and sublethal physiological response.

[from Aquatic Sciences and Fisheries Abstracts 9(4):189. 1979]

80B-1113

BIOLOGICAL FATE OF METALS IN FISH
Varanasi, U. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.41-53. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Fate, Metabolism, Fish, Arctic, Hydrocarbons, *Trace metal effects

This in-depth evaluation of the impact of trace metals on arctic and subarctic organisms was initiated to assess changes in metabolite profiles of hydrocarbons in tissues of fish exposed to lead and cadmium. Of three areas investigated, the one related to oil pollution dealt with the influence of metal exposure on hydrocarbon metabolism in fish.

[from Aquatic Sciences and Fisheries Abstracts 9(4):189. 1979]

80B-1114

MORBIDITY AND MORTALITY IN REFINERY EMPLOYEES
Weaver, N.K. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29-April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:559-589.

Oil industry, Refineries, Health hazards, Mortality, Statistical analysis, *Refinery workers

"By all means of comparison and analysis, the findings of the present study are certainly indicative of a favorable mortality experience, and tend to support the concept that the health status of refinery workers is good, in that there is a relative freedom from disorders which lead to premature death."

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

1. Biological Aspects

80B-1115
TRANSPORT, RETENTION, AND EFFECTS OF THE WATER-SOLUBLE FRACTION OF COOK INLET CRUDE OIL IN EXPERIMENTAL FOOD CHAINS
Whipple, J.A., T.G. Yocom, P.E. Benville, D.R. Smart, M.H. Cohen and M.E. Ture. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.106-129. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Uptake, Metabolism, Fate, Movement, Biological effects, WSF, Crude oil, Food web

This study attempts to determine the accumulation and passage of petroleum constituents, and the effects of exposure on test organisms. Methods, apparatus, and results of three experiments are presented.

[from Aquatic Sciences and Fisheries Abstracts 9(4):190. 1979]

80B-1116
OCSEAP: AN OVERVIEW AND A CONTEXT FOR STUDIES ON BIOLOGICAL EFFECTS
Wolfe, D.A. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.1-10. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Risk analysis, OCS, Development, BLM, NOAA, Alaska

"The Bureau of Land Management (BLM) initiated an extensive marine environmental studies program in response to national needs to assess the potential effects of OCS oil and gas development and to protect the environment." NOAA is planning and conducting the Alaskan OCS portion of the study through the offices of the Outer Continental Shelf Environmental Assessment Program (OCSEAP). Findings will enable BLM to proceed with OCS leasing with a minimum of environmental risk.

[from Aquatic Sciences and Fisheries Abstracts 9(4):189. 1979]

80B-1117
AN OVERVIEW OF NOAA'S ENERGY RESOURCES PROJECT ON FATE AND EFFECTS OF CONTAMINANTS IN MARINE ECOSYSTEMS AND ORGANISMS
Wolfe, D.A. 1978.
Marine Biological Effects of OCS Petroleum Development. D.A. Wolfe (ed.). Boulder, Colorado, NOAA Environmental Research Laboratory, 1978. p.223-225. Report NOAA-TM-ERL-OCSEAP-1. NOAA Technical Memorandum.

Fate, Environmental effects, Contamination, NOAA, Marine environment, Ecosystems

NOAA's general objectives in the title project are identified in this summary. Process-oriented rather than site-specific, the project's results are expected to have broad applicability. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(4):192. 1979]

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

2. Physical and Chemical Aspects

80B-1118
CHEMISTRY OF MARINE PETROLEUM SEEPS AND THEIR RELATION TO EXPLORATION AND POLLUTION
Reed, W.E., and I.R. Kaplan. 1977.
California Offshore Gas, Oil, and Tar Seeps. Sacramento, California State Lands Commission, 1977. p.152-225.

Exploration, Production, Chemical effects, Natural seepage, OCS, California, Hydrocarbons, Sources

This report considers problems relating to petroleum in the marine environment, emphasizing the chemical properties of natural petroleum seeps primarily in the southern California Borderland. "The purpose is to determine whether hydrocarbon composition of seawater or surface sediments reflect the composition of nearby seepage, and can be used to identify previously unknown petroleum sources."

3. Social and Economic Aspects

80B-1119
SHETLANDERS SWIM AGAINST TIDE OF OIL
Chandler, A. 1980.
National Fisherman 60(13):196-201.

Socioeconomic effects, Pipelines, Oil industry, Fisheries, UK, *Shetland Islands

In the Shetland Isles, fishermen learned about the importance of organization in the battle for fishing rights in the sites of oil pipelines, but only after a season in which many suffered damage to equipment and morale. The article recounts the experience of these Shetlanders with the young oil industry.

4. Legal and Regulatory Aspects

80B-1120
DID FAILURES IN THE NORTH SEA LEGAL REGIME CONTRIBUTE TO THE EKOFISK BLOW-OUT?
Birnie, P. 1978.
Ocean Management 4(2-4): 119-135.

Ekofisk blowout, North Sea, Legislation, Regulations, Pollution prevention

The Ekofisk blowout of April 1977 was "due to a series of errors, mainly human, contributing to and culminating in the blowout". This article examines to what extent, if any, deficiencies in the international or national law relating to prevention of pollution from seabed activities contributed to this mishap.

80B-1121
POSSIBLE GUIDELINES AND REGULATIONS IN RELATION TO THE PETROLEUM INDUSTRY AND ENVIRONMENTAL PROTECTION
De la Calle, P.A.F. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:p.621-658.

Oil industry, Guidelines, Regulations, Refineries, Tankers

Current technical problems relating to environmental protection in the oil industry are reviewed. These include problems of accidental pollution as well as chronic and operational pollution in refining and tanker transport of oil.

80B-1122
NATIONAL REGULATIONS AND PROCEDURES IN THE UK RELATING TO THE COEXISTENCE OF FISHERIES AND OFFSHORE OIL/GAS OPERATIONS
Read, A.D., and A.D. MacIntyre. 1977.
International Council for Exploration of the Sea, ICES C.M. Pap. Rep., No. C.M. 1977/E:41. 7p.

Regulations, UK, Fisheries, Offshore, Oil industry

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:94, #4336. 1979]

80B-1123
HYDROCARBON EXPLORATION AND THE MARINE ENVIRONMENT IN THE CANADIAN ARCTIC - A REGULATORY APPROACH
Wright, D.G. 1977.
International Council for Exploration of the Sea, ICES C.M. Pap. Rep., No. C.M. 1977/E:57. 7p.

Regulations, Offshore, Exploration, Arctic, Canada

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

4. Legal and Regulatory Aspects

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution, D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:95, #4353. 1979]

5. General Aspects

80B-1124
THE MARINE ENVIRONMENT AND OIL FACILITIES [NEWS BRIEF]
Anon. 1979.
London, England, Institution of Civil Engineers, 1979. ISBN 0-727-70075-8. 162p.

Marine environment, Production, Platforms, Legislation, Norway, UK, North Sea

"Papers presented at a conference sponsored by the Society for Petroleum Engineers, the Institute of Petroleum, the Society for Underwater Technology, and the Institute of Civil Engineers discuss the environmental impact of North Sea platforms, legislation for offshore facilities in the marine environment, environmental controls in the Murchison Field, . . . contingency planning, and the development of a report on accidental oil pollution of the sea by the Department of the Environment."

[from Pollution Abstracts 11(1):24. 1980]

80B-1125
OFFSHORE ECOLOGY INVESTIGATION RESULTS RELEASED
Anon. 1980.
Journal of Petroleum Technology 32(6):1002-1003.

Environmental effects, Offshore, Drilling, Production, Estuaries, Ecosystems, Gulf of Mexico, Louisiana

A two-year study of the ecological effects of Gulf of Mexico oil production was recently published by the Gulf Universities Research Consortium. The study area, about 80km southwest of New Orleans encompasses the shallow estuarine environment of Timbalier Bay. The study reports negligible adverse effects of platform-site drilling activity.

80B-1126
OFFSHORE ENVIRONMENTAL STUDY [NEWS BRIEF]
Anon. 1978.
Mechanical Engineering 100(8):61.

Offshore, Production, Environmental effects, Sediments, Hydrocarbons, Marine organisms, BLM

E. POLLUTION ASPECTS OF OIL EXPLORATION, DEVELOPMENT AND PRODUCTION

5. General Aspects

The Bureau of Land Management has awarded Southwest Research Institute a $1.9 million, 18-month contract to study the effects of petroleum production on the offshore environment. Twenty-four areas (twenty platforms and four controls) will be examined to determine populations, presence of hydrocarbons, sediment characterization, relevant pathological conditions in marine organisms, and the extent of pollutant assimilation in a healthy environment.

[from Aquatic Sciences and Fisheries Abstracts 9(3):146. 1979]

80B-1127
FAUNA OF OFFSHORE STRUCTURES
Allen, M.J., and M.D. Moore. 1977.
Annual Report, Southern California Coastal Water Resources Project, No. 77-1:179-186.

Marine organisms, Distribution, Platforms, Offshore, California

The fauna found around the oil platforms were more abundant and diverse than that of the outfalls, soft-bottom, and hard-bottom control areas. The species composition at the platforms varied with depth.

[from Aquatic Sciences and Fisheries Abstracts 8(3):124. 1978]

80B-1128
UNDERWATER INSPECTION/TESTING/MONITORING OF OFFSHORE STRUCTURES
Busby, R.F. 1979.
Ocean Engineering 6(4):355-491.

Offshore, Platforms, Monitoring, Safety, Environmental effects, *Underwater inspection

The article states that "concern for the safety of platform personnel, potential damage to the environment, and the assurance of profitable, unimpeded extraction of these offshore resources is a concern of host-country governments and the offshore operators."

80B-1129
THE OIL INDUSTRY AND MICROBIAL SYSTEMS
Chater, K.W.A., and H.J. Somerville. 1977.
Philadelphia, PA, Heyden & Sons, 1978. ISBN 0-85501-315-X. 250p.

Microorganisms, Oil industry, Legislation, Chemical effects

Proceedings of a meeting organized by the Institute of Petroleum at the

University of Warwick, England, September 1977, are included with emphasis placed on the role of microorganisms in the interaction of petroleum and petroleum chemicals in the environment. Present and prospective legislation is outlined, government attitudes are assessed, and the problems and economics of pollution management are evaluated.

[from Pollution Abstracts 11(2):253. 1980]

80B-1130
FLOATING ICE PLATFORMS FOR OIL EXPLORATION IN THE ARCTIC ISLANDS
Ekelund, M.J., and D.M. Masterson. 1980.
Arctic 33(1):168-183.

Offshore, Platforms, Exploration, Ice, Arctic, Blowout prevention, *Artificial ice platforms

A new technology is discussed for offshore drilling by which the natural ocean ice is artificially thickened into floating ice platforms. A description of the blowout prevention system is included.

80B-1131
NORTHSEA STATES [MEETING ON OIL POLLUTION CONTROL]
Foster, M. 1978.
Environmental Policy and Law 4(1):28-29.

Ekofisk blowout, Government agencies, Contingency planning, Pollution control, Safety, Oil industry, North Sea

Representatives of all North Sea states met in Oslo on 21-22 June, 1977 to consider matters related to the Ekofisk blowout. Norwegian Ministers stressed three points: that the Government did not see the necessity of modifying oil operations policy, in spite of Ekofisk; that placing control and clean-up responsibilities with the oil company was justified; and that the incident highlighted the need for cooperation between states and between oil companies to produce an effective safety plan.

[from Aquatic Sciences and Fisheries Abstracts 9(5):151. 1979]

80B-1132
STRIKING A BALANCE BETWEEN OIL AND FISH
Griscom, C.A. 1978.
Maritimes 22(1):1-17.

Oil industry, Fisheries, Offshore, Production, Environmental effects, EIS, Georges Bank, Atlantic Ocean

The article defines areas of potential conflict between the fishing industry at Georges Bank and the oil industry. Concentrating on the issue of environmental degradation threatened by full-scale oil production, the author criticizes the published environmental impact statement for inaccuracy and recommends careful petroleum development planning.

[from Aquatic Sciences and Fisheries Abstracts 9(2):231. 1979]

80B-1133
IXTOC'S OIL HAS A SILVER LINING
Hill, G. 1979.
Audubon 81(6):150-159.

Ixtoc 1 blowout, Spill response, Environmental effects, EPA

The article describes the Ixtoc 1 oil well blowout in the Gulf of Mexico. It discusses the resulting environmental damage, and it includes the response of the Environmental Protection Agency toward the pollution problem.

80B-1134
POTENTIAL IMPACT OF PETROLEUM PRODUCTS ON THE ENVIRONMENT
Korte, F. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:475-556.

Petroleum products, Environmental effects, Toxicity, PAH, Hydrocarbons, Fate, Distribution, Concentrations

The total burden on the environment of hydrocarbons and combustion products caused by the use of oil and petroleum products is assessed, and one conclusion is that "the global concentration of [oil] pollutants . . .pose no ecotoxicological problem."

80B-1135
ENVIRONMENTAL ASPECTS OF OFFSHORE MINERAL PRODUCTION IN THE EUROPEAN ECONOMIC COMMUNITY. VOLUME 1: TECHNICAL
Lampietti, F.J. 1978.
Brussels, CEC, 1978. 273p. Report CEC EUR-6034-EN.

Offshore, Production, Environmental effects, Europe, Resource management, *EEC

This study (1) describes offshore mineral resource magnitude and future importance, (2) details the state of the art technologically, (3) comments on environmental impacts, and (4) compares legal and institutional measures for environmental protection. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(5):126. 1979]

80B-1136
REFINERY EMISSIONS AND EFFLUENTS IN THE U.S. PETROLEUM INDUSTRY
Mallatt, R.C. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:387-446.

Oil industry, Refineries, US, Waste treatment, Wastewaters, Disposal, Sludge, Solid wastes

In the title paper, the section on water management and control of refinery effluents includes discussions of the Federal Water Pollution Control Act (FWPCA), the principal sources and types of pollutants, refinery waste treatment technology, and disposal of refinery sludges and other liquid and solid wastes. The economics of future environmental controls in the US petroleum industry are also considered.

80B-1137
ENVIRONMENTAL IMPACT OF THE OIL INDUSTRY - A CASE STUDY: VENEZUELA
Martinez, A.R. 1977.
Petroleum Industry and Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:761-806.

Oil industry, Environmental effects, Contamination, Socioeconomic effects, Onshore, Offshore, Venezuela

"No matter how careful a nation is, large scale oil activities subdue all others." This paper documents the large scale environmental and socio-economic effects of years of oil industry activity in Venezuela. The widespread glut of oil in Venezuela has led to wastage of resources and contamination of land, rivers and waters, and has led to irreversible socioeconomic changes.

80B-1138
IMPACT OF OIL OPERATIONS ON THE AQUATIC ENVIRONMENT
Mertens, E.W., and R.C Allred. 1977.

Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:591-619.

Environmental effects, Offshore, Production, Platforms, Refineries, Santa Barbara Channel, Bermuda, Venezuela, Gulf of Mexico

This paper presents a review of oil industry research on the fate and effects of oil in the sea and the environmental impacts of refinery effluents. Case studies from the Santa Barbara Channel, Bermuda, Lake Maracaibo, Venezuela, and Timbalier Bay, Gulf of Mexico are cited to support the conclusions that low-level chronic exposure to crude oil "has, at most, only negligible effect on marine life."

80B-1139
ENVIRONMENTAL CONSERVATION IN THE PETROLEUM INDUSTRY WITH PARTICULAR REFERENCE TO REFINING
Mofidi, M.H. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:309-385.

Oil industry, Refining, Environmental effects, Water quality, Waste treatment, Disposal, Resource management

The following topics are addressed in the title paper: control of unpleasant sensory pollution, odor nuisance, noise pollution, visual pollution, air pollution and control of water pollution. Effects of environmental regulations on refineries, need for resource conservation and waste management, and future problems of the oil refining industry are also discussed.

80B-1140
THE OFFSHORE ECOLOGY INVESTIGATION 1972 - 1974
Oppenheimer, C.H. 1977.
Rapports et Proces-Verbaux des Reunions, Conseil International pour l'Exploration de la Mer, Vol. 171:147.

Offshore, Production, Gulf of Mexico, Environmental effects, Concentrations

Described is a two-year investigation of offshore ecology by the Gulf Universities Research Consortium. Data thus far analyzed provided a basis for the following conclusions: (1) the prerequisite baseline study determining environmental impact has questionable value; (2) natural phenomena impact the ecosystem more than petroleum-related activities; (3) concentrations of "relevant" compounds are sufficiently low to present no persistant biological hazards; (4) sampling sites showed good ecological health, and (5) Timbalier Bay has undergone no significant change as a result of drilling and production since 1952.

[from Aquatic Sciences and Fisheries Abstracts 9(5):151. 1979]

80B-1141
ENVIRONMENTAL CONSERVATION IN THE PETROLEUM INDUSTRY - CURRENT IMPACTS AND TRENDS
Rescorla, A.R. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 2:659-758.

Environmental effects, Oil industry, Economics, Petroleum products, Oil transport

The primary objective of this report is "to put the economic, energy and environmental relationships facing the world in the proper perspective for consideration." A section of the report deals with environmental impacts of crude oil processing, transport, and usage.

80B-1142
ONSHORE PLANNING IMPLICATIONS OF THE OFFSHORE DEVELOPMENT OF MINERAL RESOURCES
Roberts, P.W., and T. Shaw. 1980.
Marine Policy 4(2):128-141.

Offshore, Development, Socioeconomic effects, Onshore, Resource management, Oil industry, Economics

"The authors examine the onshore consequences of the development of offshore oil and gas resources and evaluate the attempts that have been made to introduce an integrated framework for strategic planning. . . Through an analysis of the requirements of the offshore industry, the environmental, economic and social implications for the onshore zone are discussed." [possibly oil pollution related]

80B-1143
OILSPILL RISK MINIMIZATION THROUGH OPTIMAL TRACT SELECTION
Smith, R.A., K.J. Lanfear, and I.C. James, II. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L. Kerr

and C.S. Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.4.33-4.48.

Oil-gas leasing, Risk analysis, Offshore, Exploration, Oil transport, California, Spill trajectories, Models

Results of a recently completed oil spill risk assessment of the proposed Southern California lease area (OCS Sale 48) are used in a sample analysis of optimal tract and transportation route selection, in regards to oil spill minimization. The methodology presented can have a beneficial organizing effect on the decisionmaking process and on regional contingency planning.

80B-1144
OUTER CONTINENTAL SHELF OIL AND GAS BLOWOUTS
US Geological Survey. 1980.
USGS Open File Report No. 80-101. 20p.

USGS, Statistics, Blowouts, Platforms, OCS, Offshore, Development, Drilling

"The U.S. Geological Survey recently published a free 20-page report titled 'Outer Continental Shelf Oil and Gas Blowouts'. Open-File Report 80-101 is available from the Branch of Marine Oil and Gas Operations, Conservation Division, U.S. Geological Survey, 640 National Center, Reston, VA 22092."

[from Sea Technology 21(5):35. 1980]

80B-1145
STATE OF THE ART OF ENVIRONMENTAL CONSERVATION, EXPLORATION AND PRODUCTION
Van Eek, W.H. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:59-100. Paper UNEP/155.5/2.

Environmental effects, Onshore, Offshore, Exploration, Production, Oil transport, International agreements, Legislation, Waste oil, Europe, *UNEP

Reviewed are environmental impacts of onshore and offshore impacts of oil exploration, production and transportation activities, including pipeline and tanker transport. Also discussed are governmental, inter-governmental, and international organizations and regulatory bodies charged with enforcement of international oil pollution legislation.

80B-1146
ENVIRONMENTAL IMPACT OF OFFSHORE DEVELOPMENT
Westaway, M.T. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol 1:121-163.

Environmental effects, Offshore, Development, Production, Platforms, Oil terminals, Contingency planning, Monitoring

The environmental impacts of large offshore oil installations are reviewed. Considered separately are discharges from production platforms (drilling muds, produced water, displacement waters and platform runoff) oil terminals; spill contingency planning; monitoring of biological effects at Milford Haven, Lake Maracaibo, and Gulf of Mexico.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

1. Tankers and Ships

80B-1147
'BIGGEST' ALASKA SPILL [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(3):58-59.

Ships, Spill cleanup, Monitoring, Birds, Alaska, Government agencies, *USFWS

When a Panamanian ore carrier capsized in Canadian waters off southeastern Alaska in December 1979, thirty crew members were killed and approximately 100,000 gallons of oil were spilled. During rescue and cleanup operations the ship sank in Canadian territorial waters and a heavy slick surfaced. The US Fish and Wildlife Service were monitoring the oil movement because the vessel sank about 13km from Forrester Island where a National Wildlife Refuge protects a marine bird nesting area.

80B-1148
KEEPING OIL OUT OF THE ENVIRONMENT [NEWS BRIEF]
Anon. 1977.
Environmental Science and Technology 11(12):1046-1047.

Tankers, Crude oil washing, Pollution control

A new method to wash out oil cargo tanks using crude oil is described in detail and its effectiveness in both reducing ocean pollution and the amount of oil residue retained in the tank after washing is stressed.

[from Aquatic Sciences and Fisheries Abstracts 8(5):186. 1978]

80B-1149
MORE TANKER DISASTERS [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(1):2.

Tankers, Oil spills, Gulf of Mexico, *Istanbul

Two oil tanker collisions in November 1979 resulted in explosions and heavy loss of life. On November 1 the Liberian tanker Burmah Agate collided with the Liberian freighter Mimosa in the Gulf of Mexico; an oil slick 10km long followed the collision. On November 15, the Romanian tanker Independentia and the Greek freighter Eurialy collided just off Istanbul. The port of Istanbul was closed for a time, with burning oil on the water threatening the nearby shoreline.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

1. Tankers and Ships

80B-1150
NAVARINO SPILL [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(4):90.

Ships, Greece, Beaches, Coasts, **Irene Serenade* spill

The beaches on the coast of southern Greece were in danger of being polluted as the result of an explosion on the ship *Irene Serenade* which occurred in the Bay of Navarino in late February. Sparks flew off the anchor, setting the cargo afire, resulting in a series of explosions.

80B-1151
ROV AIDS VOLUME ESTIMATES OF OIL IN SUNKEN TANKERS [NEWS BRIEF]
Anon. 1980.
Sea Technology 21(1):55.

Tankers, Detection, Equipment, Product information, *Estimates of oil, *Sunken tankers

"Reliable estimates of amounts of oil remaining in sunken tankers could aid planning for possible salvage and cleanup operations." The Bedford Institute of Technology, Dartmouth, Nova Scotia, has developed a bottom-crawling remotely operated vehicle (ROV) which measures the oil-water interface in the cargo tanks of the vessel.

80B-1152
POLLUTING TANKER REFUSED ADMISSION TO SULLOM VOE
Bourne, W.R.P. 1980.
Marine Pollution Bulletin 11(4):89.

Tankers, Oil slicks, Ports, Surveillance, Regulations

The Greek tanker *Mihalis* was refused entry into Sullom Voe to take on North Sea oil for the Murphy Eastern Oil Co., after a surveillance aircraft observed an oil slick over 1.5km long and 50m wide in the tanker's wake.

80B-1153
CRUDE OIL WASHING OF OIL TANKS
Cowley, J. 1979.
M/E/R Marine Engineers Review, March:21-22.

Tankers, Oil tanks, Crude oil washing, Personnel training

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

1. Tankers and Ships

"At the IMCO Tanker Safety and Pollution Prevention Conference crude oil washing (COW) was accepted as an alternative to reduce operational pollution for existing crude oil tankers." Tanker inspection procedures are described, as are the training and qualification of ships' personnel.

[from Pollution Abstracts 11(1):33. 1980]

80B-1154
SUPERSPILL: BLACK DAY FOR BRITTANY
Grove, N. 1978.
National Geographic 154(1):124-135.

Amoco Cadiz spill, Beaches, Coasts, Environmental effects, France

"The article describes mainly with the use of photographs the Amoco Cadiz disaster that occurred off the Brittany coast during March 1978."

[from Aquatic Sciences and Fisheries Abstracts 9(2):207. 1979]

80B-1155
MARINE POLLUTION DISCHARGES FROM TANKERS AND ITS CONTROL [IN FRENCH]
Guiges, F., and J. Perieres. 1978.
Industrie du Petrole dans le Monde, Gaz-Chimie, No.497:65-77.

Tankers, Regulations, IMCO, Pollution control, Oil discharges, Ballast

The IMCO convention of 1973 obliges tankers to document the hydrocarbon percentage of the deballasting water, and to calculate the discharge percentage in liter per nautical mile. Studied by Guiges S.A. is an instrument enabling authorities to make the discharges controls and be sure that they conform to international convention regulations.

[from Aquatic Sciences and Fisheries Abstracts 9(2):228. 1979]

80B-1156
INTERNATIONAL CONFERENCE ON TANKER SAFETY AND POLLUTION PREVENTION,1978. FINAL ACT OF THE CONFERENCE WITH ATTACHMENTS, INCLUDING THE PROTOCOL OF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE SAFETY OF LIFE AT SEA, 1974 AND THE PROTOCOL ODF 1978 RELATING TO THE INTERNATIONAL CONVENTION FOR THE PREVENTION OF POLLUTION FROM SHIPS
Inter-Governmental Maritime Consultative Organization. 1978.
London, England. Inter-Governmental Maritime Consultative Organization Report CONF-780293. 106p.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

1. Tankers and Ships

Tankers, Regulations, Safety, Pollution prevention

"Regulations for the safety of tankers at sea and the prevention of oil spills were adopted. The regulations for safety at sea included surveys and certificates, construction, machinery, electrical installations, fire protection, fire detection, and fire extinction." [possibly oil pollution related]

[from UDS Water Quality Control Digest 11(3):II-37, #10C-95. 1980]

80B-1157
TANKSHIP DESIGN AND REGULATION AND ITS ECONOMIC EFFECT ON OIL CONSUMERS
Pedrick, J.L., Jr. 1978.
Journal of Maritime Law and Commerce 9(3):377-395.

Tankers, Regulations, Economic effects, Design-engineering, Segregated ballast

This study examines the impact of oil tanker design regulations on the allocation of oil to consumers. Indirect costs to the consumers and cost increases associated with the double bottom/hull controversy and segregated ballasts are assessed.

[from Oceanic Abstracts 15(5):78-06795. 1978]

80B-1158
ENVIRONMENTAL IMPACT OF THE TRANSPORT OF OIL
Sasamura, Y. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:165-228.

Oil transport, Ships, Tankers, International conventions, IMCO, Regulations, Safety, Liability, Compensation

Maritime transportation constitutes by far the largest amount of oil movement. This paper reviews the development and implementation of international conventions and other standards relating to oil pollution from tankers and ships, beginning with the year 1954. Problems of enforcement, safety measures, liability and compensation for oil pollution damage, and the need for technical assistance by IMCO and other bodies is discussed.

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

1. Tankers and Ships

80B-1159
DON'T TOUCH--TANKER TRAFFIC AROUND THE CAPE OF GOOD HOPE
Watling, J.R. 1980.
Oceans 13(4):62-64.

Oil transport, Tankers, Africa, Statistics, *Cape of Good Hope, *1968-1980 tanker spills

Since 1968, there have been twenty-one oil spills of more than 100 tons in the seas between the Cape of Good Hope and Cape Agulhas, an area through which some 600 million tons of crude oil are transported annually from the Middle East to Europe and the Americas. This article details some of these tanker spills, which represent a loss of 7% of the cargo, and points out the environmental sensitivity of estuaries, beaches and coastlines of the region.

2. Pipelines

80B-1160
PIPELINE PROBLEMS [NEWS BRIEF]
Anon. 1980.
Marine Pollution Bulletin 11(6):147-148.

Pipelines, Oil spills, Contamination, North Sea, US

This summary includes a pipeline spill in the North Sea oilfield which occured when a ship's anchor fouled a subsea pipeline, two ruptures that occured simultaneously in Fredericksburg and Manassas, Virginia, contaminating a drinking water supply from the Rapidan River, and a third in Wyoming which badly polluted the North Platte River.

80B-1161
PERFORMANCE OF OIL INDUSTRY CROSS-COUNTRY PIPELINES IN WESTERN EUROPE. STATISTICAL SUMMARY OF REPORTED SPILLAGES, 1978
De Waal, A., et al. 1979.
The Hague, Netherlands, CONCAWE Report NP-24056. 19p.

Pipelines, Statistics, Contamination, Spill removal, Oil industry, Europe

This report discusses oil spills in 1978, including causes, number of spillages, spill recovery, and contamination of potable water. The report also gives a comparison of spills for the five year period of 1974-1978.

[from UDS Water Quality Control Digest 11(3):II-37, #10C-92. 1980]

F. POLLUTION ASPECTS OF OIL TRANSPORT, TRANSFER AND STORAGE

2. Pipelines

80B-1162
VALDEZ OIL UPDATE [EDITORIAL]
Waldichuk, M. 1980.
Marine Pollution Bulletin 11(6):145-146.

Pipelines, Ports, Environmental effects, Risk analysis, Washington, Pacific coast

In January 1980, President Carter endorsed a plan of the Northern Tier Pipeline Co., Seattle, to build a 2400km pipeline from Port Angeles, Washington to Clearbrook, Minnesota. A discussion on alternative proposals, financial difficulties, and environmental risks is presented.

80B-1163
CRUDE OIL PIPELINES
Watkins, R.E. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:265-307.

Pipelines, Crude oil, Oil transport, Trans-Alaska Pipeline, Europe, Statistics, Oil spills, Contamination, Soil, Groundwater

The technological development of crude oil pipelines is reviewed, and the technology of onshore and deepwater pipelinesis briefly examined. Environmental problems of two major pipeline systems, the Trans-Alaska Pipeline (TAPS) and the Transalpine Pipeline in Europe are described. Spillages from European pipelines are tabulated and summarized for the decade 1966-1975, and the damage of oil to soil and groundwater, caused by pipeline spills, is addressed.

3. Loading and Offloading Facilities

80B-1164
OIL DUMP: PORT OF PORTLAND, OREGON
Boyer, W.C. 1979.
American Seaport 40(4):33-36.

Ports, Wastewater treatment, Ships, Gravity separation, Oregon

This wastewater-oil reception facility serves the need for disposing of oily wastewater to meet federal regulations. The process which uses chemical coagulants to speed up gravity settlement is discussed. Shipping volume has increased while continuing to meet the environmental requirements of the community.

[from Pollution Abstracts 10(5):867. 1979]

F. POLLUTION ASPECTS OF TRANSPORT, TRANSFER AND STORAGE

3. Loading and Offloading Facilities

80B-1165
THE INCIDENCE AND TREATMENT OF OIL POLLUTION IN OIL PORTS [NEWS BRIEF]
Dudley, G. 1978.
Bulletin of the Estuarine and Brackish-Water Sciences Association, No. 20:23-24.

Ports, Harbors, Tankers, Oil transfer, Spill response, Contingency planning, Personnel training, UK

Presented at the Association's 1978 local meeting at Milford Haven, the paper presents a variety of conclusions: emphasis is placed on the low probability--hence low planning priority--of in-port collisions, large pollution incidents involving grounded and damaged vessels, and severe shore pollution versus chronic small pollution occurrences. Public involvement, constant beach surveillance, good communications, rapid-response sea surface cleanup, and skilled supervision of onshore cleanup are recommended.

[from Aquatic Sciences and Fisheries Abstracts 9(3):170. 1979]

80B-1166
OIL SPILL SENSING [NEWS BRIEF]
[P.R. Mallory and Co.] 1979.
Sea Technology 20(1):53.

Detection, Monitoring, Oil spills, Tankers, Oil transfer, Equipment, Product information

"A sensor detecting hydrocarbon leaks during tanker loading/unloading operations has been developed by P.R. Mallory and Co., Indianapolis [Indiana, USA]. Spills are automatically reported by light or audio signals or on a recorder."

4. Storage Facilities

No entries.

5. Legal and Regulatory Aspects

80B-1167
THE LAW AND PRACTICE RELATING TO OIL POLLUTION FROM SHIPS
Abecassis, D.W. 1978.
London, Butterworth, 1978. 275p. Report ISBN 0-406-10105-1.

Ships, Tankers, Regulations, Oil discharges, Legislation

Summary not available.

[from Aquatic Sciences and Fisheries Abstracts 9(6):139. 1979]

6. General Aspects

80B-1168
PETROLEUM TRANSPORTATION AND PRODUCTION: OIL SPILL AND POLLUTION CONTROL [BOOK REVIEW]
Simpson, M.H. 1980.
Journal of Environmental Sciences 23(2):9-11.

Pollution control, Production, Oil storage, Oil transport, Spill cleanup, Spill response

The title book [M. Sittig. Park Ridge, New Jersey, Noyes Data Corporation, 1978. 360p.] is described as ". . .most comprehensive of the state-of-the-art and. . .well designed and current in its review of the increasingly vital topic of control of oil spills and other pollution in the production, storage, and transportation of petroleum products."

80B-1169
ENVIRONMENTAL ASPECTS OF THE TRANSPORTATION OF OIL BY SEA
Walder, C.A. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:231-260.

Tankers, Ships, Oil transport, Pollution control, Ballast, IMCO

"This paper will deal only with the bulk carriage of oil by tanker and will endeavour (a) to place oil pollution from ships in its proper perspective; (b) to discuss the environmental aspects of oil transportation and what measures have been or are being taken to reduce the amount of oil which finds its way into the sea, and (c) to review new developments and to point up certain areas [where] action is needed."

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal Methods

80B-1170
WHERE ARE ALL THE WASTE [SIC] GOING? [NEWS BRIEF]
Anon. 1978.
Nuisances and Environment No.71:75-77.

Waste oil, Spill removal, Spill disposal, Oil transport, *Amoco Cadiz* spill, Filtration, Reuse

Contaminated water and sludge from the *Amoco Cadiz* oil spill is transported by tank truck to the LeHavre plant, where the tanks are steam-heated, followed by an addition of 0.5 ‰ de-emulsifier and agitation. After filtration and secondary treatment the hydrocarbon content drops from 100ppm to 20ppm whence it is safely discharged. Recovered hydrocarbons are used to fuel the company boilers.

[from Pollution Abstracts 10(1):48. 1979]

80B-1171
BIOLOGICAL OXIDATION OF DISSOLVED COMPOUNDS IN OILFIELD-PRODUCED WATER BY A PILOT AERATED LAGOON
Beyer, A.H., L.L. Palmer, and J. Stock. 1979.
Journal of Petroleum Technology 31(February):241-245.

Refineries, Wastewater treatment, Oilfields, Oxidation, Coastal waters, California

A nineteen month field pilot test on produced water containing 20,000g total dissolved solids per cubic meter shows that dissolved organics and NH_4 compounds are removed by biooxidation in an aerated lagoon. The plant effluent was suitable for discharge into coastal waters of California.

80B-1172
ULTRAFILTRATION CHARACTERISTICS OF OIL-DETERGENT-WATER SYSTEMS: MEMBRANE-FOULING MECHANISMS
Bhattacharyya, D., A.B. Jumawan, R.B. Grieves, and L.R. Harris. 1979.
Separation Science and Technology 14(6):529-549.

Filtration, Wastewaters, Oil-water separation

"The ultrafiltration characteristics of oil (bilge oil and synthetic-based lubricating oil)-nonionic detergent-water (river water and distilled water) systems are evaluated with noncellulosic, tubular membranes." Membrane fouling and cleaning requirements are found to depend on the type of oily water systems.

[from Chemical Abstracts 91(3):#44,0960. 1979]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal Methods

80B-1173
EMISSIONS AND EFFLUENTS FROM EUROPEAN REFINERIES
Cadron, E.C., and J.P. Klein. 1977.
Petroleum Industry and the Environment, Petroleum Meeting, Paris, March 29 - April 1, 1977. United Nations Environment Programme, 1977. Seminar Papers and Documents, Vol. 1:451-472.

Waste treatment, Refineries, Environmental effects, Pollution control, Oil industry, Europe

"This paper by CONCAWE discusses. . .liquid effluent discharges from refinery operations in Europe. It deals with these in more general terms showing their impact on the environment. It identifies the sources of these effluents and emissions and what has been achieved in reducing them to date. Future trends are also discussed because pollution control is very much an ongoing effort by industry and in particular by the petroleum industry."

80B-1174
TREATMENT OF BALLAST WATER
CONCAWE. 1978.
The Hague, Holland, CONCAWE, 1978. Report No. 2/78. 64p.

Wastewater treatment, Ballast, Tankers

Summary not available.

[from A Bibliography on Marine and Estuarine Oil Pollution. D.S. Moulder and A. Varley. Plymouth, UK, Marine Pollution Information Centre, 1979. Supplement 3:88,#4284. 1979]

80B-1175
COMPACT APPARATUS FOR THE CONTINUOUS TREATMENT OF AN EMULSIFIED HYDROCARBON-CONTAINING WASTEWATER
Creusot-Loire, S.A. 1979.
German Patent application 2,837,491.

Emulsions, Wastewater treatment, Equipment, Coalescence, Filtration, Design-engineering, Patent

Ship ballast and bunker waters are treated in a slightly over-pressurized vessel comprising an inner and an outer annular chamber, the former containing an oleophilic material, the latter lined with a coarse filter material. Wastewater passes from the outer to the inner chamber, and coalesced hydrocarbons pass upward through the inner and outer chamber to the top for removal.

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal

[from Chemical Abstracts 90(13):#209,665y. 1979]

80B-1176
ADSORPTION OF SOLUBLE AROMATIC HYDROCARBONS ON GRANULAR ACTIVATED CARBON
El-Dib, M.A. 1979.
Water Research 13(3):255-258.

Adsorption, Aromatic hydrocarbons, Water quality

"Adsorption of benzene, toluene, o-oxylene, and ethylbenzene on granular activated carbon proceeds according to the Freundlich model. Adsorption parameters, K and 1/n, reflect the effects of chemical structure, solubility, and competitive interactions on the adsorption process. The validity of the carbon column technique in the removal of soluble aromatic hydrocarbons affecting water quality was substantiated." [possibly oil pollution related]

[from Pollution Abstracts 10(6):1075-1076. 1979]

80B-1177
REMOVAL OF OILS FROM SEWAGE USING POLYURETHANE FOAM [ENGLISH SUMMARY]
Gomolka, E., and B. Gomolka. 1979.
Gaz, Wodai i Technika Sanitarna 53(1):21-24.

Wastewater treatment, Skimmers, Sorbents, *Polyurethane foam

Oily wastewaters are treated with polyurethane foam. The volume of oil imbibed increased from 20-40 to 107-114% of the sponge volume when the sponge was impregnated with oil prior to use as an absorbent. A simple skimming arrangement is described.

[from Chemical Abstracts 91(2):#26, 726w. 1979]

80B-1178
SURFACE PROBLEMS OF PETROLEUM REFINERY WASTE OIL EMULSIONS
Luthy, R., R.E. Selleck, and T.R. Galloway. 1977.
Environmental Science and Technology 11(13):1211-1217.

Waste oil, Emulsions, Refining, Wastewaters, Water quality, Physical aspects

The title properties were determined by effluent water quality which appeared to be dependent on the anionic surfactants contained in the water phase, and not on the source of the oil.

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal Methods

80B-1179
IMPROVEMENT IN THE PURIFICATION OF PETROLEUM- AND OIL-CONTAINING WASTE WATERS IN PRESSURE FLOTATION DEVICES USING CATIONIC SURFACTANTS [ENGLISH SUMMARY]
Skrylev, L.D., and V.K. Ososkov. 1979.
Zhurnal Prikladnoi Khimii 52(1):208-210.

Wastewater treatment, Emulsions, Surfactants, Flotation, *Aeration

Air flotation is widely used in the title purification process, and is especially useful in removing emulsified oil. The air flotation effectiveness is enhanced by addition of certain cationic surfactants, such as acetates of C_{8-18} aliphatic amines.

[from Chemical Abstracts 91(1):#9,082q. 1979]

80B-1180
SEPARATION OF EMULSIFIED OIL
Soda, F., and T. Yugawa. 1979.
Japanese Patent Application 79 65,179.

Wastewater treatment, Emulsions, Oil-water separation, Patent, *Magnetic separation

The oily wastewater emulsion is mixed with a magnetic material (paraffin and magnetite) to adsorb oil and surfactants, then the composite is magnetically separated. In a test, total carbon decreased from 500 to less than 20ppm.

[from Chemical Abstracts 91(9):#112,090q. 1979]

80B-1181
PURIFICATION OF WASTEWATER BADLY CONTAMINATED AND CONTAINING OIL
Standard Oil Company of Indiana. 1979.
Austrian Patent 348,948.

Wastewater treatment, Refineries, Petrochemicals, Flotation, Filtration, Patent, *Coagulation

Refinery and petrochemical wastewater is settled and treated by flotation and filtration in the presence of a coagulant or flocculant to reduce the content of hydrocarbons, oils, fats, and suspended solids to 20ppm. Additional purification and water clarification steps are outlined.

[from Chemical Abstracts 90(13):#209,673z. 1979]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

1. Waste Treatment and Disposal Methods

80B-1182
SOLIDIFICATION OF WASTE OILS OR OILY SLUDGES
Takase, K. 1979.
Japanese Patent Application 79 65,179.

Waste oil treatment, Sludge, Filtration, Patent, *Solidification

Waste oils and oily sludges are solidified with an inorganic cement, Na lignosulfonate, $CaCl_2$, or NaCl and water to form slurries, followed by press-filtration.

[from Chemical Abstracts 91(7):#112,074n. 1979]

2. Oil-Water Separation

80B-1183
OIL-WATER SEPARATION AND THE IMCO PERFORMANCE TEST SPECIFICATION FOR SEPARATORS
Cormack, D., H. Parker, and T. Walsh. 1977.
Institute of Marine Engineers, London. Transactions 89(A1):20-28.

Oil-water separation, Performance testing, IMCO, Coalescence, Filtration, Dispersion, Equipment, Design-engineering, Product Information

Discussed in the title study are oil-water separator performance, general properties of dispersions, separation problems and the need for secondary coalescers and filters. Successful devices are cited. The study provides conclusions regarding the state of the art and the IMCO test itself.

[from Oceanic Abstracts 15(5):78-06640. 1978]

80B-1184
MEMBRANE FILTRATION FOR THE SEPARATION OF OIL-WATER EMULSIONS [IN GERMAN]
Paul, D., H.H.Schwarz, D. Bartsch, H.G. Hicke, et al. 1979.
Chemische Technik 31(1):24-26.

Oil-water separation, Filtration, Emulsions, Waste oil, *Membranes

Emulsified waste oils are separated by ultrafiltration using Neprophan Wolfen, Millipore PSAC, and cellulose acetate membranes; the selectivity exceeds 99%.

[from Chemical Abstracts 90(12):#192,002e. 1979]

80B-1185
OILY-WATER SEPARATOR
Sakaguchi, J. 1979.
US Patent 4,151,087.

Oil-water separation, Wastewaters, Filtration, Coalescence, Equipment, Design-engineering, Patent

Described is a compact coalescer, comprised of a stand-up single vessel divided into an upper and a lower chamber, connected by a cylindrical filter. Bilge water enters the upper chamber, large oil droplets exit at the top of the upper chamber, and the remaining water passes through the filter, where small oil droplets are trapped and coalesce, while the clarified water exits from the bottom of the separator.

[from Chemical Abstracts 91(6):#96,197x. 1979]

80B-1186
OIL/WATER SEPARATION TECHNOLOGY: THE OPTIONS AVAILABLE. PART 1
Tabakin, R.B., R. Trattner, and P.N. Cheremisinoff. 1978.
Water and Sewage Works 125(7):74-77.

Oil-water separation, Regulations, Wastewaters, Oil discharges, Bioassay, Fish, Mollusks

The article reviews federal, state and local regulatory standards for oily wastewater discharge, and treats with greater depth various oil/water separation procedures. General harmful effects of these discharges, including bioassay data concerning tainting of commercial fish and shellfish, are discussed.

[from Aquatic Sciences and Fisheries Abstracts 9(5):129. 1979]

80B-1187
OIL/WATER SEPARATION TECHNOLOGY: THE OPTIONS AVAILABLE: PART 2
Tabakin, R.B., R. Trattner, and P.N. Cheremisinoff. 1978.
Water and Sewage Works 125(8):72-75.

Oil-water separation, Equipment, Flotation, Adsorption, Refining, Oil industry

Separation devices such as air flotation, electrolysis, high-speed centrifugation, filter coalescence, carbon adsorption, biological treatment, and chemical methods are analyzed.

[from Pollution Abstracts 10(3):466-467. 1979]

80B-1188
OILY WATER SEPARATORS AND OIL CONTENT MONITORS--REVIEW OF CURRENT EQUIPMENT
Thompson, R.V., and A.B. Constantine. 1977.
Institute of Marine Engineers, London. Transactions 89(A1):1-19.

Oil-water separation, Monitoring, Equipment, Performance testing, Cost analysis, Product information

All types of separators known to be available at the time of the study were investigated, performance levels assessed, and equivalent costs noted. The evaluation emphasized capacity, efficiency, and availability. A parallel investigation of oil monitoring meters was also made.

[from Oceanic Abstracts 15(5):78-06639. 1989]

80B-1189
COST/BENEFIT ANALYSIS PROVES VALUE OF FUEL/LUBE OIL PURIFICATION
Ugander, M., and S. Svensson. 1978.
Marine Engineering/Log 83(4):77-79.

Oil-water separation, Equipment, Contamination, Cost analysis, Product information, Performance testing

"Developed by the DeLaval Separator Company. . .the WHPX centrifugal separator removes solid contaminants and water from marine fuel and lube oils without. . .loss of the purified oils. . .The WHPX is unique . . .because it expels segregated impurities in small quantities at times intervals without interrupting the flow of oil." Cost, parts life, sludge output, innovations in the discharge cycle, manpower requirements and other factors are listed.

[from Oceanic Abstracts 15(5):78-06888. 1978]

80B-1190
OILY WATER SEPARATOR SYSTEM [NEWS BRIEF]
[Velcon Filters Inc.]. 1977.
Marine Engineering Review, September:45.

Oil-water separation, Filtration, Equipment, Product information, Design-engineering

Velcon Filters Inc., USA, developed a lightweight, modular separator, series PM-1100-25, to within USCG, EPA, and federal water pollution act specifications. They are available with either manual or automatic oil drain options and include high solids capacity cartridges, corrosion resistant hardware components, epoxy coated exteriors, flexible oil drain lines, and positive displacement pumps.

[from Aquatic Sciences and Fisheries Abstracts 8(9):142. 1978]

3. Waste Oil Reclamation and Reuse

80B-1191
WASTE LUBRICATING OIL:AN ANNOTATED REVIEW
Cotton, F.O. 1979.
Report BETC/IC-79/4, NTIS Report PC-A06/MF A01. 103p.

Waste oil treatment, Reclamation, Recycling, Reuse, Disposal, Environmental effects, Bibliographies

Because of renewed interest in waste oil, in terms of recycling, energy conservation, and as a threat to the environment, there is a need for a systematic compilation of information on the subject. This listing includes 486 references and a brief summary of the contents of most articles.

[from UDS Water Quality Control Digest 11(3): II-37, # 10C-90. 1980]

80B-1192
CHEMICAL TREATMENT HELPS REFINERY RECOVER OIL FROM WASTE
Gruette, J.L. 1979.
Pollution Engineering 11(10): 44-45.

Waste oil treatment, Refineries, Regulations, Economics, Reclamation, Water quality, Oil removal

"Petroleum refinery waste products contain potentially valuable oil, if it can be extracted economically. At the same time refinery wastewaters need to be treated to provide effluent of a quality that meets regulatory requirements. One large refinery has achieved these goals by using chemical treatment."

[from UDS Water Quality Control Digest 11(2):II-21, # 9K-257. 1980]

G. PETROLEUM AND PETROCHEMICAL INDUSTRY WASTE TREATMENT AND DISPOSAL

3. Waste Oil Reclamation and Reuse

80B-1193
ALTERNATIVE INSTITUTIONAL APPROACHES TO RECYCLING USED OIL
Irwin, W.A. 1977.
Resource Conservation-Social and Economic Dimensions of Recycling
D.W.Pearce and I.Walter (eds.). New York, New York University Press, 1977. p.268-295.

Recycling, Waste oil, Disposal, US, Resource management

This paper deals with "alternative institutional approaches to recycling used-oil", by discussing what types of used-oil exist, the waste and damage caused by improper use or disposal, and the technical processess used in preparing used-oil for recycling. The means for achieving used-oil recycling policy in the United States is also presented.

[from Technology Review 80(8):61. 1978]

4. Legal and Regulatory Aspects

No Entries

H. MISCELLANEOUS

80B-1194
NORWAY FISHERMEN LOSE FIGHT FOR OIL COMPENSATION [NEWS BRIEF]
Anon. 1978.
Fishing News International 17(11):8.

Fisheries, Oil industry, Offshore, Compensation, Norway

"After three years of argument, the Norwegian government has announced that it will not be compensating trawling companies for the closure of fishing grounds by the offshore oil industry." Government rationale cites seabed cleanup as basis for dismissal of claims. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(2):237. 1979]

H. MISCELLANEOUS

80B-1195
LITERATURE ON THE GULF OF BOTHNIA PUBLISHED IN THE YEARS 1950-1974
Armelius, N., B.Ekman, and M.Heinaanen (eds.) 1977.
Merentutkimuslaitoksen Julkaisu, No. 242:1-168. Abstract.

Bibliographies, Environmental effects, Contamination, Finland, Sweden

A bibliography of studies on the environment and pollution in the Gulf of Bothnia and the Aaland and Archipelago seas is presented by Finland and Sweden's Joint Committee for the Gulf of Bothnia. The work includes about 1,500 titles. [possibly oil pollution related]

[from Oceanic Abstracts 15(5):78-06644. 1978]

80B-1196
FLOTTA MARINE TERMINAL, ORKNEY. ENVIRONMENTAL ASSESSMENT WITH PARTICULAR REFERENCE TO VISUAL IMPACT
Cairns, W.J. 1977.
Landscape Design,No.118:12-15.

Oil terminals, UK, Environmental effects, Design-engineering, *Visual impact

The article gives detailed descriptions of the title project, from survey, environmental and visual impact assessments, to the engineering design and terminal construction. Emphasis is placed upon the environmental impact procedure. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(5):150. 1979]

80B-1197
BARIUM CONTENT OF MARINE SEDIMENTS NEAR DRILLING SITES: A POTENTIAL POLLUTION INDICATOR
Chow, T.J., J.L.Earl, J.H.Reed, N.Hansen, and V.Orphan. 1978.
Marine Pollution Bulletin 9(4):97-99.

Sediments, Offshore, Drilling, California,*Barium

"Barite is commonly used as a weighting agent in oil-and gas-well drilling mixture; therefore, the distribution pattern of barium in marine sediments near drilling sites may provide an indicator of anthropogenic chemical contamination from these operations." Barium content is measured in several Southern California sites. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(4):180. 1979]

H. MISCELLANEOUS

80B-1198
SCIENCE IN EUROPE/MORATORIUM SET ON ANTARCTIC OIL AT OCTOBER MEETING
Hawkes, N. 1977.
Science 198(4318):709-713.

Offshore, Onshore, Exploration, Antarctica, International conventions, Europe

The Ninth Consultative Meeting of the Antarctic treaty held in London in October 1977 is discussed. The two major outcomes were a moratorium on oil exploration and extraction in Anarctica, and the first outline of a convention to govern fishing in the area. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 8(5):2-3. 1978]

80B-1199
OIL-RELATED ACTIVITIES IN SCOTTISH UNIVERSITIES
Heriot-Watt University, Edinburgh. 1978.
Edinburgh, UK, Heriot-Watt University, 1978. 20p.(Publication No. ISBN 0-901658-391)

Offshore, Onshore, Development, Oil industry, Scotland, *Oil related university research

This booklet catalogues oil-related activities in progress at all eight universities of Scotland in the realm of individual, team, multidisciplinary interdepartmental and inter-university research efforts. Topically organized, it is intended as a book of reference to government, industry, commerce, the press and the public. [possibly oil pollution related]

[from Aquatic Sciences and Fisheries Abstracts 9(2):3. 1979]

80B-1200
THE COLLAPSE OF A COLUMN OF FLUID ONTO A HORIZONTAL SURFACE
Kerr, C.L., and D.K.Babu. 1979.
Workshop on the Physical Behavior of Oil in the Marine Environment, Princeton University, Princeton, New Jersey, May 8-9, 1979. C.L.Kerr and C.S.Barrientos (organizers). Department of Civil Engineering, Princeton University, and Techniques Development Laboratory, National Weather Service, NOAA, 1979. p.2.15-2.35.

Behavior, Physical aspects, Simulations, Models, *Mathematical analysis

The problem of a fluid bursting onto a dry horizontal surface is investigated mathematically. The solution to the problem is achieved through representation of the fluid motion by the depth-averaged balance laws of mass and linear momentum. Comparison between numerical and analytical techniques shows reasonable agreement between the solutions. [possibly oil pollution related]

Guide to the Master List of Keywords and the Subject Keyword Index

The following Master List of Keywords is a controlled list of approximately 400 scientific, technical, geographic, and other descriptive terms relevant to the field of oil pollution. For each literature abstract and research project summary contained in this issue, a string of several terms has been selected from this list to serve as a reference guide to each entry. The Master List is continually updated to reflect common word usage and current trends in oil pollution literature and research. When necessary, additional free-language terms are assigned to more thoroughly define the subject coverage of an entry; such terms are preceded by an asterisk (*).

The terms included in the Master List are alphabetically permuted by computer to form the Subject Keyword Index. Thus, the string of keywords for each abstract is listed in all possible alphabetical arrangements to provide rapid access to, and cross-referencing of, any entry in this issue. The free-language terms (*) are not alphabetically permuted.

To effectively use the permuted Subject Keyword Index, the reader should use the following procedure: 1) Scan the Master List of Keywords and Cross-Reference Guide to determine all possible terms and word variants applicable to the topic of interest; 2) look up all terms in the permuted Subject Keyword Index and scan the other keywords in each entry to determine the relevancy of the entry; 3) note the citation numbers of relevant entries and locate them in the body of the ABSTRACTS.

MASTER LIST OF KEYWORDS AND CROSS-REFERENCE GUIDE TO RELATED TERMS

S: See
SA: See also

- Absorption
  - SA: Adsorption, Sorbents
- Activated sludge
  - SA: Biological treatment, Sludge, Solid wastes
- Acute effects
  - SA: Biological effects, Mortality, Toxicity
- Adsorption
  - SA: Absorption, Sorbents
- Africa
- Air-Sea interface
  - S: Sea surface
- Alabama
- Alaska
  - SA: Gulf of Alaska
- Algae
  - SA: Phytoplankton
- Amoco Cadiz spill
  - SA: France
- Analytical techniques
  - SA: Bioassay, Chemical analysis, Chromatography, Concentrations, Detection, GC/MS, Source identification, Spectrometry, Spectroscopy
- Animals
  - SA: Birds, Invertebrates, Marine mammals, Marine organisms, Vertebrates, Wildlife
- Annelids
  - SA: Invertebrates, Marine organisms, Polychaetes
- Antarctica
- API (American Petroleum Institute)
- Aquatic environment
  - SA: Freshwater, Lakes, Marine environment, Rivers, Sea surface
- Arctic
  - SA: Ice, Subarctic regions
- Arctic Ocean
- Argentina
- Argo Merchant spill
- Aromatic hydrocarbons
  - SA: Hydrocarbons, PAH
- Atlantic coast
- Atlantic Ocean
- Australia
- Bacteria
  - SA: Microorganisms
- Bahamas
- Ballast
- Baltic Sea
  - SA: Segregated ballast, Tankers, Wastewater treatment
- Barents Sea
- Baseline studies
  - SA: EIS
- Bays
  - SA: Coastal waters, Estuaries, Harbors
- Beach cleanup
  - SA: Spill cleanup
- Beaches
  - SA: Coasts, Intertidal zone, Sediments, Shorelines
- Beaufort Sea
- Behavior
  - SA: (Physical) Dispersion, Drift, Fate, Models, Movement, Predictions, Simulations, Spreading
  - SA: (Biological) Bioassay, Biological effects, Development, Growth, Toxicity
- Benthos
  - SA: Invertebrates, Marine organisms
- Bering Sea
- Bermuda
- Bibliographies
- Bilges
  - S: Ballast, Ships, Tankers
- Bioassay
  - SA: Analytical techniques
- Biodegradation
  - SA: Bacteria, Microorganisms

- Biogenic hydrocarbons
  - SA: Hydrocarbons
- Bioindicators
  - SA: Detection
- Biological effects
  - SA: Acute effects, Chronic effects, Sublethal effects, Toxicity
- Biological treatment
  - SA: Wastewater treatment
- Biomass
- Birds
  - SA: Animals, Vertebrates, Wildlife
- Black Sea
  - SA: USSR
- BLM (Bureau of Land Management)
  - SA: Government agencies, US government
- Blowout prevention
- Blowouts
- Book review
- Booms
  - SA: Design-engineering, Equipment, Spill containment
- Bouchard 65 spill
  - SA: Buzzards Bay
- Brazil
- Burning
  - SA: Incineration
- Buzzards Bay
  - SA: Massachusetts
- California
  - SA: Pacific coast
- Canada
- Carcinogens
  - SA: Health hazards, Mutagens, PAH
- Caribbean Sea
- Caspian Sea
  - SA: USSR
- Chemical analysis
  - SA: Analytical techniques, Chromatography, Detection, GC/MS, Source identification, Spectrometry, Spectroscopy
- Chemical effects
- Chesapeake Bay
  - SA: Delaware, Maryland
- Chile
- China
- Chromatography
  - SA: Analytical techniques, Chemical analysis, GC/MS
- Chronic effects
  - SA: Biological effects, Toxicity
- Coalescence
  - SA: Flocculation, Wastewater treatment
- Coastal waters
  - SA: Atlantic coast, Bays, Coasts, Harbors, Pacific coast
- Coastal zone management
  - SA: Environmental management, Resource management
- Coasts
  - SA: Bays, Beaches, Coastal waters, Harbors, Ports, Shorelines
- Cold Climates
  - SA: Arctic, Arctic Ocean, Subarctic regions
- Compensation
  - SA: Insurance, Liability
- Concentrations
  - SA: Analytical techniques, Chemical analysis, Chromatography, Detection
- Connecticut
- Conservation
  - SA: Coastal zone management, Environmental management, Resource management
- Containment
  - S: Booms, Equipment, Spill cleanup, Spill containment
- Contamination
- Contingency planning
  - SA: Spill cooperatives, Spill response
- Coral reefs
- Cost analysis
  - SA: Economics, Economic effects
- Crankcase oil
  - SA: Lubricating oil
- Crude oil
  - SA: Aromatic hydrocarbons, Hydrocarbons
- Crude oil washing
  - SA: Ballast, Oil discharges, Segregated ballast, Tankers
- Crustaceans
  - SA: Invertebrates, Marine organisms
- Deepwater ports

Degradation
  SA: Biodegradation
  SA: Harbors, Oil terminals, Ports
Delaware
Delaware Bay
Demulsification
Denmark
Depuration
  SA: Uptake
Design-engineering
  SA: Equipment, Patent, Performance testing, Product information
Detection
  SA: Analytical techniques, Bioindicators, Chemical analysis, Monitoring, Remote sensing, Source identification, Surveillance
Development
  SA: (Oil) Drilling, Exploration, Offshore, Production;
  SA: (Biological) Behavior, Biological effects, Growth, Metabolism
Diesel fuel
  S: Fuel oil
Dispersants
  SA: Emulsifiers, Spill cleanup, Surfactants
Dispersion
  SA: Behavior, Drift, Movement, Spreading
Disposal
  SA: Waste oil, Wastewaters
Distribution
  SA: Concentrations, Hydrocarbons
DOE (Department of Energy)
  SA: Government agencies, US government
Drift
  SA: Behavior, Dispersion, Models, Movement, Simulations, Spreading
Drilling
  SA: Exploration, Offshore, Oil fields, Oil wells, Platforms
Echinoderms
  S: Invertebrates, Marine organisms
Economic effects
  SA: Socioeconomic effects
Economics
  SA: Cost analysis
Ecosystems
  SA: Food web, Habitats, Niches
Ecuador
Effluents
  S: Wastewaters
Effluent treatment
  S: Wastewater treatment
EIS (Environmental Impact Statement)
  SA: Baseline studies
Ekofisk blowout
Emulsification
  SA: Dispersants, Surfactants
Emulsions
Engineering
  S: Design-engineering
England
  S: UK
English Channel
Environmental effects
Environmental Impact Statement
  S: Baseline studies, EIS
Environmental management
  S: Coastal zone management, Resource management
Environmental protection
  S: Pollution control, Pollution prevention
EPA (Environmental Protection Agency)
  SA: Government agencies, US government
Equipment
  SA: Booms, Patents, Product information, Skimmers, Spill cleanup
ERDA (Energy Research and Development Administration)
  SA: DOE, Government agencies, US government
Estuaries
  SA: Bays
Europe
Evaporation
Exploration
  SA: Development, Drilling, Offshore, Production

- Extraction
  - SA: Oil shale, Production, Tar sands
- Fate
  - SA: Behavior, Drift, Spreading
- FEA (Federal Energy Administration)
  - SA: DOE, ERDA, Government agencies, US government
- Field testing
  - S: Performance testing
- Filtration
  - SA: Flocculation, Wastewater treatment
- Fingerprinting
  - S: Source identification
- Finland
- Fish
  - SA: Vertebrates, Marine organisms
- Fisheries
- Flocculation
  - SA: Coalescence, Filtration, Wastewater treatment
- Florida
- Florida spill
- Flotation
  - SA: Oil-water separation, Wastewater treatment
- Food chain
  - S: Food web
- Food web
- Foreign governments
  - SA: Government agencies
- Fossil fuels
  - SA: Crude oil
- France
- Freshwater
  - SA: Groundwater, Lakes, Rivers, Water quality
- Fuel oil
- Fuels
  - S: Fossil fuels, Fuel oil, Gasoline, Petroleum products
- Fungi
  - SA: Microorganisms
- Gas-liquid chromatography
  - S: Chemical analysis, Chromatography
- Gasoline
  - SA: Fuel oil
- GC/MS (Gas chromatography/Mass spectrometry)
  - SA: Analytical techniques, Chemical analysis, Chromatography, Spectrometry
- Georges Bank
  - SA: Atlantic Ocean, OCS
- Georgia
- Germany
- Government agencies
  - SA: BLM, DOE, EPA, ERDA, FEA, NOAA, USCG, USGS, USN; Foreign governments, State governments, US government
- Gravity separation
  - SA: Oil-water separation, Wastewater treatment
- Great Britain
  - S: UK
- Great Lakes
- Greenland
- Groundwater
  - SA: Freshwater, Water quality
- Growth
  - SA: Behavior, Development, Metabolism
- Guidelines
  - SA: Manuals, Regulations
- Gulf of Alaska
  - SA: Alaska
- Gulf of Mexico
  - SA: Mexico
- Habitats
  - SA: Ecosystems
- Harbors
  - SA: Bays, Coastal waters, Deepwater ports, Oil terminals, Ports
- Health hazards
  - SA: Carcinogens
- Hydrocarbons
  - SA: Aromatic hydrocarbons, Biogenic hydrocarbons, Crude oil, PAH, WSF
- Ice
  - SA: Arctic, Subarctic regions
- Illinois
- IMCO (International Maritime Consultative Organization)
  - SA: International agreements
- Incineration
  - SA: Burning, Waste oil treatment

India
Indian Ocean
Indonesia
Industries
  SA: Oil industry, Petrochemicals
Information systems
Infrared spectroscopy
  S: Analytical techniques, Spectroscopy
Insurance
  SA: Compensation, Liability
International agreements
  SA: Foreign governments
International conventions
  SA: Foreign governments, Legislation, Regulations
Intertidal zone
  SA: Beaches, Coastal Waters, Shorelines
Invertebrates
  SA: Benthos, Crustaceans, Echinoderms, Marine organisms, Mollusks
Iran
Ireland
  SA: UK
Israel
Italy
Ixtoc 1 blowout
  SA: Gulf of Mexico, Mexico
Japan
Kuwait
Labrador Sea
Lakes
  SA: Freshwater, Great Lakes
Land farming
  SA: Waste oil disposal
Land spills
  SA: Leakage, Onshore, Onshore impacts, Pipelines
Law enforcement
  SA: Legislation, Regulations, Surveillance
Leakage
  SA: Oil discharges
Legislation
  SA: International conventions, Law enforcement Regulations
Liability
  SA: Compensation, Insurance, Law enforcement
Lightering
  S: Oil transfer, Ships, Tankers
Louisiana
Lubricating oil
  SA: Crankcase oil
Maine
Manuals
  SA: Guidelines
Marine environment
  SA: Offshore, Sea surface, Seawater
Marine mammals
  SA: Animals, Vertebrates, Wildlife
Marine organisms
  SA: Animals, Annelids, Crustaceans, Echinoderms, Fish, Invertebrates, Microorganisms, Mollusks, Vertbrates
Marshes
Maryland
Massachusetts
Mass spectrometry
  S: GC/MS, Spectrometry
Mass spectroscopy
  S: Spectroscopy
Mediterranean Sea
Metabolism
  SA: Depuration, Growth, Uptake
Metula spill
  SA: Strait of Magellan
Mexico
  SA: Gulf of Mexico
Michigan
  SA: Great Lakes
Microorganisms
  SA: Algae, Bacteria, Biodegradation, Fungi, Yeasts
Mississippi
Mississippi River
Models
  SA: Behavior, Predictions, Simulations, Spill trajectories
Mollusks
  SA: Invertebrates, Marine organisms
Monitoring
  SA: Detection, Remote sensing, Sampling, Surveillance
Mortality
  SA: Acute effects, Toxicity

Motor oil
  S: Crankcase oil
Mousse
  S: Emulsions, Emulsification
Movement
  SA: Behavior, Drift, Spreading
Mutagens
  SA: Carcinogens, Health hazards
Narragansett Bay
  SA: Rhode Island
Natural seepage
  SA: Santa Barbara Channel
New Jersey
New York
Niches
  S: Ecosystems, Habitats
NOAA (National Oceanic and Atmospheric Adminstration)
  SA: Government agencies, US government
North Carolina
North Sea
Norway
Oceans
  S: Arctic Ocean, Atlantic Ocean, Indian Ocean, Marine environment, Pacific Ocean
OCS (Outer Continental Shelf)
  SA: Development, Drilling, Exploration, Offshore, Oil fields, Oil-gas leasing, Production
Offloading
  S: Oil transfer, Ships, Tankers
Offshore
  SA: Development, Drilling, Exploration, OCS, Oil fields, Oil-gas leasing, Oil wells, Platforms, Production
Oil
  S: Crankcase oil, Crude oil, Fossil fuels, Fuel oil, Lubricating oil, Oil shale, Petroleum products, Residual oils, Tar, Tar sands, Waste oil, WSF
Oil discharges
  SA: Leakage
Oil fields
  SA: Offshore, Platforms, Production
Oil-gas leasing
  SA: Development, Drilling, OCS, Offshore, Production
Oil industry
  SA: Industries, Petrochemicals, Refineries
Oil removal
  SA: Pollution control, Spill cleanup, Spill removal
Oil sands
  S: Tar sands
Oil shale
  SA: Extraction
Oil slicks
Oil spills
  SA: Spill cleanup, Spill containment, Spill disposal, Spill removal, Spill response
Oil tanks
  SA: Storage
Oil terminals
  SA: Deepwater ports, Harbors, Oil transfer, Ports
Oil transfer
  SA: Harbors, Ports
Oil transport
  SA: Pipelines, Tankers
Oil-water separation
  SA: Gravity separation, Waste oil treatment, Wastewater treatment
Oil wells
  SA: Drilling, Offshore, Oil fields, Production
Olympic Games spill
Onshore
  SA: Land spills
Onshore impacts
Oregon
Oxidation
  SA: Biodegradation, Weathering
Pacific coast
Pacific Ocean
PAH (Polycyclic aromatic hydrocarbons)
  SA: Aromatic hydrocarbons, Hydrocarbons
Patent
  SA: Design-engineering, Equipment
Pennsylvania

Performance testing
SA: Design-engineering, Equipment, Product information
Persian Gulf
Personnel training
SA: Contingency planning, Spill response
Petrochemicals
Petroleum
S: Hydrocarbons, Petroleum products
Petroleum industry
S: Oil industry, Refineries
Petroleum products
SA: Crankcase oil, Fuel oil, Fuels, Gasoline, Lubricating oil
Philippines
Physical aspects
Physical effects
SA: Behavior, Drift, Movement
Phytoplankton
SA: Algae, Microorganisms, Plankton
Pipelines
SA: Oil transfer, Oil transport, Trans-Alaska Pipeline
Plankton
S: Microorganisms, Phytoplankton, Zooplankton
Plants
SA: Vegetation
Platforms
SA: Drilling, Exploration, Offshore, Production, Oil wells
Pollution control
Pollution prevention
SA: Environmental protection, Contingency planning
Polychaetes
S: Annelids, Invertebrates, Marine organisms
Ports
SA: Deepwater ports, Harbors, Oil terminals
Portugal
Predictions
SA: Models, Simulations, Spill trajectories
Product information
SA: Design-engineering, Equipment, Performance testing
Production
SA: Development, Drilling, Exploration, Offshore
Prudhoe Bay
SA: Alaska, Gulf of Alaska
Puerto Rico
Puget Sound
SA: Washington
Reclamation
SA: Recycling, Reuse
Recovery
SA: Restoration
Recycling
SA: Reclamation, Reuse
Red Sea
Refineries
SA: Oil industry
Refining
Regulations
SA: Government agencies, Guidelines, International agreements, International conventions, Legislation
Release
S: Depuration
Remote sensing
SA: Detection, Monitoring, Source identification, Surveillance
Reproduction
Residual oils
S: Tar, Waste oil
Resource management
SA: Coastal zone management
Restoration
SA: Recovery
Reuse
SA: Reclamation, Recycling
Rhine River
SA: Germany, Mediterranean Sea
Rhode Island
Risk analysis
SA: Economics, Statistical analysis, Statistics
Rivers
SA: Freshwater, Onshore
Russia
S: USSR

Safety
  SA: Health hazards
Sampling
  SA: Detection, Monitoring, Source identification
San Francisco Bay
  SA: California
Sansinena spill
Santa Barbara Channel
  SA: California
Sargasso Sea
  S: Atlantic Ocean
Scotland
  SA: UK
Seabirds
  S: Birds
Sea surface
Seawater
  SA: Marine environment, Sea surface
Sedimentation
Sediments
  SA: Soil
Segregated ballast
  SA: Ballast, Crude oil washing, Tankers
Ships
  SA: Tankers
Shorelines
  SA: Beaches, Coasts
Simulations
  SA: Models, Predictions
Sinking agents
Skimmers
  SA: Design-engineering, Equipment, Spill cleanup
Sludge
  SA: Activated sludge, Solid wastes
Socioeconomic effects
  SA: Economic effects
Soil
  SA: Sediments
Solid wastes
  SA: Disposal, Sludge
Solubility
Solution
Solvents
  S: Dispersants, Emulsifiers
Sorbents
  SA: Absorption, Adsorption
Source identification
  SA: Detection, Monitoring, Remote sensing, Sampling, Surveillance
Sources
South Carolina
Soviet Union
  S: USSR
Spain
Spectrometry
  SA: Analytical techniques, Chemical analysis, GC/MS
Spectroscopy
  SA: Analytical techniques, Chemical analysis
Spill cleanup
  SA: Booms, Dispersants, Equipment, Pollution control, Sinking agents, Skimmers, Spill containment
Spill containment
Spill cooperatives
  SA: Contingency planning, Spill cleanup, Spill response
Spill disposal
Spill removal
Spill response
  SA: Contingency planning, Spill cleanup, Spill cooperatives
Spill trajectories
  SA: Drift, Models, Movement, Predictions
Spreading
  SA: Behavior, Drift, Models, Movement, Oil slicks
St. Lawrence River
  SA: Great Lakes
State governments
  SA: Government agencies, Regulations
Statistical analysis
Statistics
Storage
  SA: Oil tanks
Strait of Magellan
  SA: Chili
Strategic Petroleum Reserve
Streams
  S: Freshwater, Onshore, Rivers

- Subarctic regions
  - SA: Arctic, Cold climates
- Sublethal effects
  - SA: Biological effects, Toxicity
- Superports
  - S: Deepwater ports, Oil terminals, Ports
- Supertankers
  - S: Tankers
- Surfactants
  - SA: Dispersants, Emulsifiers
- Surveillance
  - SA: Law enforcement, Monitoring, Remote sensing
- Sweden
- Tainting
  - S: Contamination
- Tank farms
  - S: Oil tanks, Storage
- Tankers
  - SA: Oil transport, Ships
- Tar
  - SA: Residual oils
- Tar sands
- Testing
  - S: Performance testing
- Texas
- Torrey Canyon spill
- Toxicity
  - SA: Acute effects, Biological effects
- Trans-Alaska Pipeline
  - SA: Alaska, Pipelines
- Tropical regions
- UK (United Kingdom)
- Ultrafiltration
  - S: Filtration
- UN (United Nations)
  - SA: International agreements, International conventions
- Uptake
  - SA: Depuration, Growth, Metabolism
- Urquiola spill
  - SA: Spain
- US (United States)
- USCG (US Coast Guard)
- US Government
  - SA: Government agencies
- USGS (US Geological Survey)
  - SA: Government agencies, US government
- USN (US Navy)
- USSR (Union of Soviet Socialist Republics)
- Vegetation
  - SA: Plants
- Venezuela
- Vertebrates
  - SA: Animals, Birds, Marine mammals, Marine organisms
- Virgin Islands
- Virginia
- Washington
- Waste oil
  - SA: Disposal, Reclamation, Recycling, Residual oils
- Waste oil treatment
- Wastewaters
- Wastewater treatment
  - SA: Oil-water separation
- Waterfowl
  - S: Birds
- Water quality
  - SA: Freshwater, Groundwater
- Water soluble fraction
  - S: WSF
- Weathering
- Wildlife
  - SA: Animals, Birds, Marine organisms, Marine mammals
- WSF (Water soluble fraction)
  - SA: Crude oil, Hydrocarbons, Solution
- Yeasts
  - SA: Microorganisms
- Zooplankton
  - SA: Microorganisms, Plankton

0754 ABSORPTION, MONITORING, PAH, ANALYTICAL TECHNIQUES
0841 " SPILL CONTAINMENT, BOOMS, EQUIPMENT, SORBENTS, PRODUCT INFORMATION
0847 " SPILL CLEANUP, CRUDE OIL, SORBENTS, PRODUCT INFORMATION, *BREGOIL
0849 " SPILL REMOVAL, SORBENTS, PRODUCT INFORMATION, *POLYPROPYLENE ROPE
0925 ACUTE EFFECTS, CHRONIC EFFECTS, MARINE ORGANISMS
1112 " CHRONIC EFFECTS, TOXICITY, UPTAKE, DEPURATION, SUBLETHAL EFFECTS, MARINE ORGANISMS, ALASKA , *OCSEAP PROGRAM
0954 ADSORPTION, SEDIMENTS, PHYSICAL ASPECTS, HYDROCARBONS , TAR, *AUTOPURIFICATION
0959 " DISTRIBUTION, CONTAMINATION, PHYSICAL ASPECTS, OIL SLICKS, TAR, SEDIMENTS, SEA SURFACE, MEDITERRANEAN SEA
1176 " AROMATIC HYDROCARBONS, WATER QUALITY
1187 " OIL-WATER SEPARATION, EQUIPMENT, FLOTATION, FILTRATION, REFINING, OIL INDUSTRY
0897 AFRICA, BLOWOUTS, POLLUTION CONTROL, *NIGERIAN WELL BLOWOUT
1159 " OIL TRANSPORT, TANKERS, STATISTICS, *CAPE OF GOOD HOPE, *1968-1980 TANKER SPILLS
0787 ALABAMA, REMOTE SENSING, MONITORING, OIL FIELDS, WATER QUALITY
0822 ALASKA , CONCENTRATIONS, HYDROCARBONS , SAMPLING, PORTS , HARBORS, SEDIMENTS, PIPELINES, TANKERS, COASTAL WATERS
0884 " CONTINGENCY PLANNING, SPILL RESPONSE, BEAUFORT SEA
0889 " CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, BEHAVIOR, FATE, COLD CLIMATES, ARCTIC, US, CANADA, BEAUFORT SEA, *WORKSHOP
0952 " SEA SURFACE, COASTS, SPILL TRAJECTORIES, DRIFT, MOVEMENT, ARCTIC, ICE, *CURRENTS, *METEOROLOGY
0969 " MICROORGANISMS, BASELINE STUDIES, BIODEGRADATION, OCS
0970 " BASELINE STUDIES, ECOSYSTEMS, CHEMICAL EFFECTS, MICROORGANISMS, FOOD WEB, OCS, DEVELOPMENT
0975 " BASELINE STUDIES, ENVIRONMENTAL EFFECTS, OCS, DEVELOPMENT, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0976 " BASELINE STUDIES, ENVIRONMENTAL EFFECTS, OCS, DEVELOPMENT, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0983 " OFFSHORE, OIL DISCHARGES, INTERNATIONAL AGREEMENTS, REGULATIONS, OCS
1019 " BIODEGRADATION, DISTRIBUTION, MICROORGANISMS, OCS, *COOK INLET
1052 " BEHAVIOR, FATE, MOVEMENT, ICE, PRUDHOE BAY
1107 " FISH, CRUDE OIL, CHRONIC EFFECTS, CONTAMINATION, SEDIMENTS, COASTAL WATERS, OCS, BERING SEA
1112 " ACUTE EFFECTS, CHRONIC EFFECTS, TOXICITY, UPTAKE, DEPURATION, SUBLETHAL EFFECTS, MARINE ORGANISMS, *OCSEAP PROGRAM
1116 " RISK ANALYSIS, OCS, DEVELOPMENT, BLM, NOAA
1147 " SHIPS, SPILL CLEANUP, MONITORING, BIRDS, GOVERNMENT AGENCIES, *USFWS
0919 ALGAE, PETROLEUM PRODUCTS, FUEL OIL, TOXICITY, CONCENTRATIONS, MORTALITY, *SYNECHOCYSTIS AQUATILIS
0926 " TOXICITY, INVERTEBRATES, COASTAL WATERS, BARENTS SEA
0923 AMOCO CADIZ SPILL, BIOLOGICAL EFFECTS, INTERTIDAL ZONE, DETECTION, INVERTEBRATES, *NEMATODES, *COPEPODS
0928 " MARINE ORGANISMS, INVERTEBRATES, *CONVOLUTA ROSCOFFENSIS
0931 " ONSHORE, SAMPLING, COASTS, INTERTIDAL ZONE, BENTHOS, ECOSYSTEMS, FRANCE
0933 " BIOLOGICAL EFFECTS, DEVELOPMENT, GROWTH, MOLLUSKS, *DENTALIUM EGGS
0943 " BIRDS, MORTALITY
0964 " SOCIOECONOMIC EFFECTS, COASTS, BEACHES, FRANCE, *TOURISM
0989 " BEACHES, COASTS, ENVIRONMENTAL EFFECTS, FISHERIES, FRANCE
0994 " BENTHOS, ENVIRONMENTAL EFFECTS, COASTAL WATERS, FRANCE
0998 " ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, FRANCE
1014 " SHORELINES, ENVIRONMENTAL EFFECTS, LIABILITY, CHRONIC EFFECTS, COASTS, FRANCE
1154 " BEACHES, COASTS, ENVIRONMENTAL EFFECTS, FRANCE
1170 " WASTE OIL, SPILL REMOVAL, SPILL DISPOSAL, OIL TRANSPORT, FILTRATION, BILGE
0754 ANALYTICAL TECHNIQUES, ABSORPTION, MONITORING, PAH
0772 " DETECTION, CONTAMINATION, GROUNDWATER
0774 " PETROLEUM PRODUCTS, SPECTROMETRY, CHROMATOGRAPHY, DETECTION
0792 " REMOTE SENSING, PERFORMANCE TESTING, OIL SLICKS, *LASER FLUOROSENSORS
0802 " CHEMICAL ANALYSIS, SPECTROSCOPY, FRESHWATER, SEAWATER, SOURCE IDENTIFICATION
0810 " CHEMICAL ANALYSIS, NATURAL SEEPAGE, TAR, CRUDE OIL, COASTAL WATERS, BEACHES, CALIFORNIA
0816 " OIL SPILLS, SOURCE IDENTIFICATION, *MULTICOMPONENT FLUORESCENCE
0825 " OIL SPILLS, SOURCE IDENTIFICATION, *MULTICOMPONENT FLUORESCENCE
0961 " PHYSICAL ASPECTS, OIL SLICKS
1006 " PAH, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, CONTAMINATION, METABOLISM, CARCINOGENS, MUTAGENS, BIBLIOGRAPHIES
1025 ANNELIDS, BIODEGRADATION, BENTHOS, SEDIMENTS, COASTS, DETECTION, PAH, MICROORGANISMS
0820 ANTARCTICA, CHEMICAL ANALYSIS, HYDROCARBONS , PAH, CONCENTRATIONS, CONTAMINATION, SEDIMENTS
1199 " OFFSHORE, ONSHORE, EXPLORATION, INTERNATIONAL CONVENTIONS, EUROPE
0852 ARCTIC, SPILL REMOVAL, CRUDE OIL, BURNING, ENVIRONMENTAL EFFECTS
0861 " SPILL CLEANUP, SPILL RESPONSE, ICE, CANADA, BEAUFORT SEA
0883 " SPILL RESPONSE, ICE, CANADA, SPILL CONTAINMENT, SPILL CLEANUP, MONITORING, INCINERATION, *AMOP PROGRAM

0889 ARCTIC, ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, BEHAVIOR, FATE, COLD CLIMATES, US, CANADA, BEAUFORT SEA, *WORKSHOP
0890 " SPILL RESPONSE, EQUIPMENT, ICE, SPILL CONTAINMENT, SPILL REMOVAL, MONITORING, CANADA, BEAUFORT SEA
0908 " POLLUTION CONTROL, OIL SPILLS, STATISTICS, CANADA, SPILL RESPONSE
0917 " BIOLOGICAL EFFECTS, MAMMALS, MORTALITY, CANADA, *POLAR BEARS
0929 " CRUDE OIL, CHEMICAL EFFECTS, SOIL, *TUNDRA, *SOIL RESPIRATION
0952 " ALASKA , SEA SURFACE, COASTS, SPILL TRAJECTORIES, DRIFT, MOVEMENT, ICE, *CURRENTS, *METEOROLOGY
0957 " ICE, BLM, NOAA, SEA SURFACE, *OIL ENTRAINMENT, *SEASONAL VARIATIONS, *NORCOR/OCS
1008 " BEHAVIOR, SPILL CLEANUP, ICE, CANADA, *RESEARCH REVIEW
1015 " ENVIRONMENTAL EFFECTS, NOAA, SUBARCTIC REGIONS, BIBLIOGRAPHIES
1046 " BEHAVIOR, PHYSICAL ASPECTS, OIL SLICKS, MODELS, PREDICTIONS, SPILL TRAJECTORIES, COLD CLIMATES, ICE, *WORKSHOP PROCEEDINGS
1049 " FATE, ICE, SPREADING, BEHAVIOR
1054 " BEHAVIOR, PHYSICAL EFFECTS, CRUDE OIL, ICE, SEAWATER
1113 " FATE, METABOLISM, FISH, HYDROCARBONS , *TRACE METAL EFFECTS
1123 " REGULATIONS, OFFSHORE, EXPLORATION, CANADA
1130 " OFFSHORE, PLATFORMS, EXPLORATION, ICE, BLOWOUT PREVENTION, *ARTIFICIAL ICE PLATFORMS
0915 ARGO MERCHANT SPILL, TOXICITY, CONTAMINATION, FISH, *COD EGGS
1088 " SIMULATIONS, MODELS, MOVEMENT, SPREADING, OIL SLICKS, SEA SURFACE, *SURFACE CURRENTS
0942 AROMATIC HYDROCARBONS, BIOLOGICAL EFFECTS, MARINE ORGANISMS, *NAPHTHALENES
1028 " BIODEGRADATION, MICROORGANISMS
1040 " BIODEGRADATION, HYDROCARBONS , MICROORGANISMS, CRUDE OIL, PETROLEUM PRODUCTS, METABOLISM
1105 " MARINE ORGANISMS, INVERTEBRATES, UPTAKE, CONCENTRATIONS, TOXICITY
1176 " ADSORPTION, WATER QUALITY
0805 ATLANTIC COAST, DISTRIBUTION, CONCENTRATIONS, HYDROCARBONS , SOURCES, SEDIMENTS, OCS, MASSACHUSETTS
0797 ATLANTIC OCEAN, SAMPLING, CHEMICAL ANALYSIS, DISTRIBUTION, NATURAL SEEPAGE, SEAWATER, WEATHERING, CRUDE OIL, NOAA, CARIBBEAN SEA
1012 " EUROPE, REGULATIONS, MONITORING, FISHERIES
1090 " CRUDE OIL, TAR, WEATHERING, DISTRIBUTION, BIOLOGICAL EFFECTS, *NEUSTONIC PERIPHYTON
1132 " OIL INDUSTRY, FISHERIES, OFFSHORE, PRODUCTION, ENVIRONMENTAL EFFECTS, EIS, GEORGES BANK
1022 BACTERIA, BIODEGRADATION, MEDITERRANEAN SEA, CONCENTRATIONS, DISTRIBUTION, SEAWATER, SEDIMENTS, *DETERGENTS
1027 " BIODEGRADATION, CRUDE OIL, HYDROCARBONS , *ARTHROBACTER SP
1029 " BIODEGRADATION, OIL SPILLS
1032 " BIODEGRADATION, MARINE ENVIRONMENT, CONTAMINATION
1033 " BIODEGRADATION, CRUDE OIL
1103 " OIL FIELDS, OCS, GULF OF MEXICO, PLATFORMS, TOXICITY, SAMPLING
0751 BALLAST , SPILL CLEANUP, SPILL REMOVAL, MONITORING, EQUIPMENT, PRODUCT INFORMATION
1096 " SOURCES, COASTAL WATERS, CONTAMINATION, MEDITERRANEAN SEA
1155 " TANKERS, REGULATIONS, IMCO, POLLUTION CONTROL, OIL DISCHARGES
1169 " TANKERS, SHIPS, OIL TRANSPORT, POLLUTION CONTROL, IMCO
1174 " WASTEWATER TREATMENT, TANKERS
0813 BALTIC SEA, SAMPLING, HYDROCARBONS , CONCENTRATIONS, SEAWATER, SEDIMENTS
0819 " SAMPLING, PETROLEUM PRODUCTS, SEAWATER, NORTH SEA
0926 BARENTS SEA, ALGAE, TOXICITY, INVERTEBRATES, COASTAL WATERS
0806 BASELINE STUDIES, DISTRIBUTION, FATE, MOVEMENT, GULF OF ALASKA, BERING SEA, *SUSPENDED PARTICULATES
0968 " HYDROCARBONS , MICROORGANISMS, OCS, BEAUFORT SEA, BIODEGRADATION
0969 " ALASKA , MICROORGANISMS, BIODEGRADATION, OCS
0970 " ALASKA , ECOSYSTEMS, CHEMICAL EFFECTS, MICROORGANISMS, FOOD WEB, OCS, DEVELOPMENT
0972 " PREDICTIONS, FATE, DRIFT, SPILL TRAJECTORIES, MONITORING, SEA SURFACE, OCS, BERING SEA
0973 " RISK ANALYSIS, SEDIMENTATION, COASTS, SHORELINES, GULF OF ALASKA, *SPILL VULNERABILITY
0974 " DISTRIBUTION, MONITORING, MOLLUSKS, *RAZOR CLAMS
0975 " ALASKA , ENVIRONMENTAL EFFECTS, OCS, DEVELOPMENT, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0976 " ALASKA , ENVIRONMENTAL EFFECTS, OCS, DEVELOPMENT, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0977 " BIODEGRADATION, MICROORGANISMS, SEDIMENTS, GULF OF ALASKA
0978 " ENVIRONMENTAL EFFECTS, BLOWOUTS, OFFSHORE, EXPLORATION, CANADA
0979 " OCS, OIL-GAS LEASING, EXPLORATION, DEVELOPMENT, US, GOVERNMENT AGENCIES, *DEPARTMENT OF THE INTERIOR
0980 " ICE, SPILL TRAJECTORIES, MOVEMENT, DRIFT, BEAUFORT SEA, *CHUKCHI SEA
0753 BAYS, MONITORING, HYDROCARBONS , WSF, CHEMICAL ANALYSIS, SAMPLING, COASTS, DISTRIBUTION, CONTAMINATION, *ADRIATIC SEA
0967 " RECOVERY, RESTORATION, BIOLOGICAL EFFECTS, ESTUARIES, SEDIMENTS, CANADA, *CHEDABUCTO BAY SPILL

1000 BAYS, BEHAVIOR, COLD CLIMATES, ICE, BOUCHARD 65 SPILL, BUZZARDS BAY, SPILL RESPONSE
0769 BEACHES, MONITORING, MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, SUBLETHAL EFFECTS, TOXICITY, UNEP, MEDITERRANEAN SEA, *MALTA
0803 " DISTRIBUTION, SAMPLING, TAR, ZOOPLANKTON, COASTAL WATERS, DRILLING, MEDITERRANEAN SEA, *NEUSTON
0810 " ANALYTICAL TECHNIQUES, CHEMICAL ANALYSIS, NATURAL SEEPAGE, TAR, CRUDE OIL, COASTAL WATERS, CALIFORNIA
0826 " EXPLORATION, PRODUCTION, OFFSHORE, SAMPLING, TAR, NATURAL SEEPAGE, SOURCES, DISTRIBUTION, SANTA BARBARA CHANNEL, CALIFORNIA
0829 " SOURCE IDENTIFICATION, NATURAL SEEPAGE, TAR, COASTS, SANTA BARBARA CHANNEL, CALIFORNIA, INTERTIDAL ZONE, *ASPHALT DEPOSITS
0851 " SPILL CLEANUP, DISPERSANTS, COASTAL WATERS, UK
0887 " MANUALS, GUIDELINES, SPILL CLEANUP, PERSONNEL TRAINING, SHORELINES, EQUIPMENT
0920 " TOXICITY, DISPERSANTS, SEAWATER, PERFORMANCE TESTING, UK
0964 " AMOCO CADIZ SPILL, SOCIOECONOMIC EFFECTS, COASTS, FRANCE, *TOURISM
0989 " AMOCO CADIZ SPILL, COASTS, ENVIRONMENTAL EFFECTS, FISHERIES, FRANCE
0997 " SEDIMENTS, INTERTIDAL ZONE, ENVIRONMENTAL EFFECTS, CHILE, *NORTHERN BREEZE SPILL
1024 " BIODEGRADATION, SPILL CLEANUP, CRUDE OIL, SEDIMENTS, SHORELINES, MICROORGANISMS, CONNECTICUT
1061 " IXTOC 1 BLOWOUT, FATE, GULF OF MEXICO, COASTS, SPILL TRAJECTORIES, MODELS
1150 " SHIPS, GREECE, COASTS, *IRENE SERENADE SPILL
1154 " AMOCO CADIZ SPILL, COASTS, ENVIRONMENTAL EFFECTS, FRANCE
0861 BEAUFORT SEA, ARCTIC, SPILL CLEANUP, SPILL RESPONSE, ICE, CANADA
0884 " ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE
0889 " ARCTIC, ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, BEHAVIOR, FATE, COLD CLIMATES, US, CANADA, *WORKSHOP
0890 " ARCTIC, SPILL RESPONSE, EQUIPMENT, ICE, SPILL CONTAINMENT, SPILL REMOVAL, MONITORING, CANADA
0968 " BASELINE STUDIES, HYDROCARBONS , MICROORGANISMS, OCS, BIODEGRADATION
0980 " BASELINE STUDIES, ICE, SPILL TRAJECTORIES, MOVEMENT, DRIFT, *CHUKCHI SEA
1058 " PREDICTIONS, OIL SPILLS, MOVEMENT, OFFSHORE, DEVELOPMENT, *STORM SURGES
1095 " PREDICTIONS, MOVEMENT, BEHAVIOR, ICE, SPILL TRAJECTORIES, *CHUKCHI SEA
0786 BEHAVIOR, REMOTE SENSING, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, CALIFORNIA, FATE, DISTRIBUTION, OIL SLICKS, MOVEMENT, *METEOROLOGY, *OCEANOGRAPHY
0834 " SPILL CONTAINMENT, BOOMS, PHYSICAL EFFECTS, DESIGN-ENGINEERING, EQUIPMENT, PERFORMANCE TESTING
0889 " BEAUFORT SEA, ARCTIC, ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, FATE, COLD CLIMATES, US, CANADA, *WORKSHOP
0953 " OIL SLICKS, PHYSICAL ASPECTS, *SUNLIGHT GLITTER
0958 " FATE, DISPERSION, OIL SLICKS, *OIL ENTRAINMENT, *WATER COLUMN
0960 " DISPERSION, OIL SLICKS, PHYSICAL EFFECTS, *SEA STATE
1000 " BAYS, COLD CLIMATES, ICE, BOUCHARD 65 SPILL, BUZZARDS BAY, SPILL RESPONSE
1008 " ARCTIC, SPILL CLEANUP, ICE, CANADA, *RESEARCH REVIEW
1043 " ICE, RIVERS, COLD CLIMATES, BUZZARDS BAY, *ETHEL H SPILL, *HUDSON RIVER
1044 " SPREADING, OIL SLICKS, SEA SURFACE, PHYSICAL ASPECTS
1046 " ARCTIC, PHYSICAL ASPECTS, OIL SLICKS, MODELS, PREDICTIONS, SPILL TRAJECTORIES, COLD CLIMATES, ICE, *WORKSHOP PROCEEDINGS
1047 " NATURAL SEEPAGE, SOURCES, MOVEMENT, FATE, SEA SURFACE, PHYSICAL ASPECTS, SANTA BARBARA CHANNEL, CALIFORNIA, *OCEANOGRAPHY
1048 " PHYSICAL ASPECTS, MOVEMENT, ICE, COLD CLIMATES, CANADA, *RESEARCH REVIEW
1049 " ARCTIC, FATE, ICE, SPREADING
1050 " PHYSICAL ASPECTS, FATE, ICE, COLD CLIMATES, *BEAUFORT SEA
1051 " FATE, PHYSICAL ASPECTS, SPREADING, OIL SLICKS
1052 " ALASKA , FATE, MOVEMENT, ICE, PRUDHOE BAY
1053 " PHYSICAL ASPECTS, ICE, CONTAMINATION, CANADA, *KURDISTAN SPILL
1054 " ARCTIC, PHYSICAL EFFECTS, CRUDE OIL, ICE, SEAWATER
1055 " PHYSICAL ASPECTS, FATE, ICE
1056 " EMULSIFICATION, CRUDE OIL, PHYSICAL EFFECTS, *TURBULENCE
1059 " MODELS, SIMULATIONS, OIL INDUSTRY, OIL SLICKS, MOVEMENT, SPREADING, EVAPORATION
1066 " PREDICTIONS, MODELS, OIL SLICKS, COASTAL WATERS, ESTUARIES, *CIRCULATION MODELING
1068 " MODELS, SIMULATIONS, ENVIRONMENTAL EFFECTS, FISHERIES, GEORGES BANK
1073 " PREDICTIONS, MOVEMENT, DISTRIBUTION, SEA SURFACE
1075 " PREDICTIONS, MODELS, SEA SURFACE, OIL SLICKS, MOVEMENT
1076 " MODELS, MOVEMENT, SPREADING, SEA SURFACE, OIL SLICKS, *HYDRODYNAMIC EQUATIONS
1082 " MODELS, OIL SLICKS, DISPERSION, EMULSIFICATION, USN, USCG, *WAVTOP PROGRAM
1083 " MODELS, SIMULATIONS, PHYSICAL EFFECTS, FATE, OIL SPILLS
1085 " BEAUFORT SEA, PREDICTIONS, MOVEMENT, ICE, SPILL TRAJECTORIES, *CHUKCHI SEA
1086 " MODELS, PREDICTIONS, SIMULATIONS, SPILL TRAJECTORIES, ENVIRONMENTAL EFFECTS, COASTS, NOAA
1102 " SUBLETHAL EFFECTS, FISH, OCS, DEVELOPMENT, PACIFIC OCEAN
1106 " UPTAKE, METABOLISM, SUBLETHAL EFFECTS, FISH, *BIOTRANSFORMATION, *TRACE METAL EFFECTS
1200 " PHYSICAL ASPECTS, SIMULATIONS, MODELS, *MATHEMATICAL ANALYSIS
0765 BENTHOS, SAMPLING, SEDIMENTS, FISH, MOLLUSKS, INVERTEBRATES, PAH, COASTAL WATERS, *MALTA

0931 BENTHOS, AMOCO CADIZ SPILL, ONSHORE, SAMPLING, COASTS, INTERTIDAL ZONE, ECOSYSTEMS, FRANCE
0951 " PETROLEUM PRODUCTS, SURFACTANTS, MARINE ORGANISMS, MOLLUSKS
0992 " BIOLOGICAL EFFECTS, WILDLIFE, COLD CLIMATES, LEGISLATION, SOCIOECONOMIC EFFECTS, EKOFISK BLOWOUT, *AIBS, *PROCEEDINGS
0994 " AMOCO CADIZ SPILL, ENVIRONMENTAL EFFECTS, COASTAL WATERS, FRANCE
1025 " ANNELIDS, BIODEGRADATION, SEDIMENTS, COASTS, DETECTION, PAH, MICROORGANISMS
1098 " HYDROCARBONS , SEDIMENTS, FOOD WEB, CONTAMINATION, UPTAKE, MARINE DETRITIVORES
0806 BERING SEA, BASELINE STUDIES, DISTRIBUTION, FATE, MOVEMENT, GULF OF ALASKA, *SUSPENDED PARTICULATES
0972 " BASELINE STUDIES, PREDICTIONS, FATE, DRIFT, SPILL TRAJECTORIES, MONITORING, SEA SURFACE, OCS
1107 " ALASKA , FISH, CRUDE OIL, CHRONIC EFFECTS, CONTAMINATION, SEDIMENTS, COASTAL WATERS, OCS
0811 BERMUDA, SAMPLING, DETECTION, TAR, CONCENTRATIONS, SEAWATER
0824 " CHEMICAL ANALYSIS, HYDROCARBONS , COASTS, SEDIMENTS, HARBORS, OFFSHORE
1138 " ENVIRONMENTAL EFFECTS, OFFSHORE, PRODUCTION, PLATFORMS, REFINERIES, SANTA BARBARA CHANNEL, VENEZUELA, GULF OF MEXICO
0761 BIBLIOGRAPHIES, DETECTION, REMOTE SENSING, MONITORING, SURVEILLANCE
0853 " SPILL CLEANUP, DISPERSANTS, CANADA
0999 " FATE, ENVIRONMENTAL EFFECTS, MARINE ENVIRONMENT, CANADA
1006 " ANALYTICAL TECHNIQUES, PAH, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, CONTAMINATION, METABOLISM, CARCINOGENS, MUTAGENS
1015 " ARCTIC, ENVIRONMENTAL EFFECTS, NOAA, SUBARCTIC REGIONS
1038 " BIODEGRADATION, MARINE ENVIRONMENT, MICROORGANISMS
1191 " WASTE OIL TREATMENT, RECLAMATION, RECYCLING, REUSE, DISPOSAL , ENVIRONMENTAL EFFECTS
1195 " ENVIRONMENTAL EFFECTS, CONTAMINATION, FINLAND, SWEDEN
0798 BIOASSAY, CHEMICAL ANALYSIS, CONCENTRATIONS, HYDROCARBONS
1186 " OIL-WATER SEPARATION, REGULATIONS, WASTEWATERS, OIL DISCHARGES, FISH, MOLLUSKS
0763 BIODEGRADATION, MONITORING, SAMPLING, MICROORGANISMS, MOLLUSKS, CONCENTRATIONS, BLACK SEA, MEDITERRANEAN SEA, USSR
0910 " SPILL RESPONSE, SPILL CLEANUP, FATE, MOVEMENT, DRIFT, WEATHERING
0968 " BEAUFORT SEA, BASELINE STUDIES, HYDROCARBONS , MICROORGANISMS, OCS
0969 " BASELINE STUDIES, ALASKA , MICROORGANISMS, OCS
0977 " BASELINE STUDIES, MICROORGANISMS, SEDIMENTS, GULF OF ALASKA
1017 " CONTAMINATION, ENVIRONMENTAL EFFECTS, ESTUARIES, COASTAL WATERS, SEDIMENTS, SOURCES, DISTRIBUTION
1019 " ALASKA , DISTRIBUTION, MICROORGANISMS, OCS, *COOK INLET
1020 " UPTAKE, METABOLISM, MICROORGANISMS, MAMMALS, ENVIRONMENTAL EFFECTS
1021 " OXIDATION, SEDIMENTS, PHYSICAL ASPECTS
1022 " BACTERIA, MEDITERRANEAN SEA, CONCENTRATIONS, DISTRIBUTION, SEAWATER, SEDIMENTS, *DETERGENTS
1023 " REFINERIES, WASTE OIL, LAND FARMING, DISPOSAL , SLUDGE
1024 " BEACHES, SPILL CLEANUP, CRUDE OIL, SEDIMENTS, SHORELINES, MICROORGANISMS, CONNECTICUT
1025 " BENTHOS, ANNELIDS, SEDIMENTS, COASTS, DETECTION, PAH, MICROORGANISMS
1026 " PETROLEUM PRODUCTS, INDUSTRIES, MICROORGANISMS
1027 " BACTERIA, CRUDE OIL, HYDROCARBONS , *ARTHROBACTER SP
1028 " AROMATIC HYDROCARBONS, MICROORGANISMS
1029 " BACTERIA, OIL SPILLS
1030 " MICROORGANISMS, SURFACTANTS, GROWTH, HYDROCARBONS
1031 " CRUDE OIL, SEAWATER, MICROORGANISMS, MARINE ORGANISMS, MOLLUSKS, *NEMATODES, *POLYCHAETES, *SUBSTRATES
1032 " BACTERIA, MARINE ENVIRONMENT, CONTAMINATION
1033 " BACTERIA, CRUDE OIL
1034 " CRUDE OIL, SEAWATER, *STEEL CORROSION RESISTANCE
1035 " TOXICITY, UPTAKE, OXIDATION, HYDROCARBONS , *ALIPHATICS
1036 " MICROORGANISMS, METABOLISM, HYDROCARBONS , *ALICYCLIC HYDROCARBONS
1037 " WEATHERING, OXIDATION, MICROORGANISMS, USSR
1038 " BIBLIOGRAPHIES, MARINE ENVIRONMENT, MICROORGANISMS
1039 " SPILL CLEANUP, GROUNDWATER, SOIL, RESTORATION, RECOVERY, EMULSIFICATION
1040 " AROMATIC HYDROCARBONS, HYDROCARBONS , MICROORGANISMS, CRUDE OIL, PETROLEUM PRODUCTS, METABOLISM
1041 " HYDROCARBONS , MICROORGANISMS, *GENETICS
1108 " MICROORGANISMS, CRUDE OIL, UPTAKE, SEAWATER, SEDIMENTS, COLD CLIMATES
0823 BIOGENIC HYDROCARBONS, DETECTION, CHEMICAL ANALYSIS, HYDROCARBONS , GC/MS, SEDIMENTS, *GULF OF CALIFORNIA
0922 BIOINDICATORS, MARINE ORGANISMS, CONTAMINATION, NORTH SEA
1109 " HYDROCARBONS , SEAWATER, CRUSTACEANS, *CANCER MAGISTER, *CHEMORECEPTION
0807 BIOLOGICAL EFFECTS, CHEMICAL ANALYSIS, CONTAMINATION, DISTRIBUTION, COASTAL WATERS, HARBORS, MARINE ORGANISMS, INDIA, *MADRAS
0815 " CHEMICAL ANALYSIS, DRILLING, PLATFORMS, SAMPLING, SEDIMENTS, MARINE ORGANISMS
0858 " SPILL CLEANUP, DISPERSANTS, PRODUCT INFORMATION
0916 " BIRDS, GROWTH, DEVELOPMENT, *EGG HATCHABILITY

0917 BIOLOGICAL EFFECTS, ARCTIC, MAMMALS, MORTALITY, CANADA, *POLAR BEARS
0923 " AMOCO CADIZ SPILL, INTERTIDAL ZONE, DETECTION, INVERTEBRATES, *NEMATODES, *COPEPODS
0924 " MOLLUSKS, REPRODUCTION, MORTALITY, CHRONIC EFFECTS, SUBLETHAL EFFECTS
0927 " DISPERSANTS, CRUDE OIL, CRUSTACEANS, *ACID PHOSPHATASE ACTIVITY, *CATHEPSIN D ACTIVITY, *CRANGON CRANGON L.
0932 " BIRDS, MORTALITY, FUEL OIL, *INCUBATING GULLS
0933 " AMOCO CADIZ SPILL, DEVELOPMENT, GROWTH, MOLLUSKS, *DENTALIUM EGGS
0935 " PLANTS, CRUDE OIL, CONCENTRATIONS, *PHOTOSYNTHESIS, *NITZSCHIA PALEA
0936 " PETROLEUM PRODUCTS, MARINE ORGANISMS, MICROORGANISMS
0937 " NORTH SEA, PLANKTON, CONTAMINATION
0942 " AROMATIC HYDROCARBONS, MARINE ORGANISMS, *NAPHTHALENES
0950 " TOXICITY, MUTAGENS, WEATHERING, HYDROCARBONS
0967 " BAYS, RECOVERY, RESTORATION, ESTUARIES, SEDIMENTS, CANADA, *CHEDABUCTO BAY SPILL
0992 " BENTHOS, WILDLIFE, COLD CLIMATES, LEGISLATION, SOCIOECONOMIC EFFECTS, EKOFISK BLOWOUT, *AIBS, *PROCEEDINGS
1006 " BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH, CHEMICAL ANALYSIS, CONTAMINATION, METABOLISM, CARCINOGENS, MUTAGENS
1009 " OIL SPILLS, INTERTIDAL ZONE, PHYSICAL EFFECTS, CHEMICAL EFFECTS, *EXPERIMENTAL DESIGN
1090 " ATLANTIC OCEAN, CRUDE OIL, TAR, WEATHERING, DISTRIBUTION, *NEUSTONIC PERIPHYTON
1094 " NATURAL SEEPAGE, TAR, CRUDE OIL, CHEMICAL ANALYSIS, DISTRIBUTION, SOURCES, FATE, OFFSHORE, SANTA BARBARA CHANNEL, CALIFORNIA
1099 " BIRDS, FUEL OIL, DEVELOPMENT, *SEABIRDS, *EGG FORMATION
1111 " DRILLING, TOXICITY
1115 " UPTAKE, METABOLISM, FATE, MOVEMENT, WSF, CRUDE OIL, FOOD WEB
0875 BIRDS, RESTORATION, RECOVERY, *SEABIRD REHABILITATION
0876 " WILDLIFE, RESTORATION, POLLUTION CONTROL, CANADA
0901 " SPILL RESPONSE, POLLUTION CONTROL, INTERNATIONAL AGREEMENTS, UK, EUROPE
0916 " BIOLOGICAL EFFECTS, GROWTH, DEVELOPMENT, *EGG HATCHABILITY
0930 " TOXICITY, CRUDE OIL, FUEL OIL, *MALLARD DUCKS, *EMBRYOTOXICITY
0932 " BIOLOGICAL EFFECTS, MORTALITY, FUEL OIL, *INCUBATING GULLS
0939 " CRUDE OIL, WEATHERING, METABOLISM, *TESTOSTERONE, *GULLS
0943 " AMOCO CADIZ SPILL, MORTALITY
0946 " CRUDE OIL, TOXICITY, GROWTH, HABITATS
0948 " UK, *VULNERABILITY, *AUKS
0965 " RESTORATION, *SEABIRD RESCUE
0966 " RESTORATION, MORTALITY, UK
0995 " SPILL RESPONSE, OIL INDUSTRY, BOOK REVIEW, *BIRD PROTECTION
1099 " BIOLOGICAL EFFECTS, FUEL OIL, DEVELOPMENT, *SEABIRDS, *EGG FORMATION
1110 " CRUDE OIL, MORTALITY, SUBLETHAL EFFECTS, GULF OF ALASKA, *HERRING GULLS
1147 " ALASKA , SHIPS, SPILL CLEANUP, MONITORING, GOVERNMENT AGENCIES, *USFWS
0763 BLACK SEA, BIODEGRADATION, MONITORING, SAMPLING, MICROORGANISMS, MOLLUSKS, CONCENTRATIONS, MEDITERRANEAN SEA, USSR
0817 " FATE, COASTAL WATERS, TAR, WEATHERING, OXIDATION, USSR
0955 " PHYSICAL EFFECTS, CHEMICAL EFFECTS, TOXICITY, WSF, *PICAREL
0957 BLM, ARCTIC, ICE, NOAA, SEA SURFACE, *OIL ENTRAINMENT, *SEASONAL VARIATIONS, *NORCOR/OCS
1116 " ALASKA , RISK ANALYSIS, OCS, DEVELOPMENT, NOAA
1126 " OFFSHORE, PRODUCTION, ENVIRONMENTAL EFFECTS, SEDIMENTS, HYDROCARBONS , MARINE ORGANISMS
0999 BLOWOUT PREVENTION, PRODUCT INFORMATION, EQUIPMENT
0912 " POLLUTION CONTROL, OIL INDUSTRY, DRILLING, PLATFORMS, PERSONNEL TRAINING, SAFETY, *UNEP
1130 " ARCTIC, OFFSHORE, PLATFORMS, EXPLORATION, ICE, *ARTIFICIAL ICE PLATFORMS
0897 BLOWOUTS, AFRICA, POLLUTION CONTROL, *NIGERIAN WELL BLOWOUT
0898 " IXTOC 1 BLOWOUT, GULF OF MEXICO, MEXICO
0979 " BASELINE STUDIES, ENVIRONMENTAL EFFECTS, OFFSHORE, EXPLORATION, CANADA
1060 " SIMULATIONS, OIL SLICKS, MOVEMENT, SPREADING, NORTH SEA, *SLIKTRACK
1144 " USGS, STATISTICS, PLATFORMS, OCS, OFFSHORE, DEVELOPMENT, DRILLING
0944 BOOK REVIEW, HEALTH HAZARDS, CARCINOGENS, PAH, MICROORGANISMS, MAMMALS
0995 " BIRDS, SPILL RESPONSE, OIL INDUSTRY, *BIRD PROTECTION
0834 BOOMS, BEHAVIOR, SPILL CONTAINMENT, PHYSICAL EFFECTS, DESIGN-ENGINEERING, EQUIPMENT, PERFORMANCE TESTING
0835 " SPILL CONTAINMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION
0837 " SPILL CONTAINMENT, EQUIPMENT, PRODUCT INFORMATION, *COLLECTANT SPRAYING
0838 " SPILL CONTAINMENT, OIL SLICKS, PHYSICAL EFFECTS
0839 " SPILL CONTAINMENT, EQUIPMENT, PRODUCT INFORMATION
0840 " SPILL CONTAINMENT, DESIGN-ENGINEERING, EQUIPMENT, PRODUCT INFORMATION
0841 " ABSORPTION, SPILL CONTAINMENT, EQUIPMENT, SORBENTS, PRODUCT INFORMATION
0842 " SPILL CONTAINMENT, EQUIPMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION
0843 " SPILL CONTAINMENT, UK, EQUIPMENT, PRODUCT INFORMATION
0969 " SPILL CLEANUP, SKIMMERS, DESIGN-ENGINEERING, EQUIPMENT, PERFORMANCE TESTING, OIL-WATER SEPARATION, PRODUCT INFORMATION
1000 BOUCHARD 65 SPILL, BEHAVIOR, BAYS, COLD CLIMATES, ICE, BUZZARDS BAY, SPILL RESPONSE
0852 BURNING, ARCTIC, SPILL REMOVAL, CRUDE OIL, ENVIRONMENTAL EFFECTS

0891 BURNING, SPILL RESPONSE, PERFORMANCE TESTING, ICE, COLD CLIMATES
1000 BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR, BAYS, COLD CLIMATES, ICE, SPILL RESPONSE
1043 " BEHAVIOR, ICE, RIVERS, COLD CLIMATES, *ETHEL H SPILL, *HUDSON RIVER
0758 CALIFORNIA, NATURAL SEEPAGE, TAR, COASTAL WATERS, DISTRIBUTION, SOURCES, *SANTA MONICA BAY, *GEOPHYSICS
0759 " NATURAL SEEPAGE, TAR, COASTAL WATERS, OCS, STATISTICS, *SEISMICITY
0782 " REMOTE SENSING, DETECTION, MONITORING, NATURAL SEEPAGE, TAR, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY, *OCEANOGRAPHY
0786 " BEHAVIOR, REMOTE SENSING, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, FATE, DISTRIBUTION, OIL SLICKS, MOVEMENT, *METEOROLOGY, *OCEANOGRAPHY
0810 " BEACHES, ANALYTICAL TECHNIQUES, CHEMICAL ANALYSIS, NATURAL SEEPAGE, TAR, CRUDE OIL, COASTAL WATERS
0826 " BEACHES, EXPLORATION, PRODUCTION, OFFSHORE, SAMPLING, TAR, NATURAL SEEPAGE, SOURCES, DISTRIBUTION, SANTA BARBARA CHANNEL
0829 " BEACHES, SOURCE IDENTIFICATION, NATURAL SEEPAGE, TAR, COASTS, SANTA BARBARA CHANNEL, INTERTIDAL ZONE, *ASPHALT DEPOSITS
0893 " CONTINGENCY PLANNING, SPILL RESPONSE, GOVERNMENT AGENCIES
0963 " NATURAL SEEPAGE, CRUDE OIL, LUBRICATING OIL, RECYCLING, SANTA BARBARA CHANNEL, *WESSON OIL, *SENSUALITY INDEX
1047 " BEHAVIOR, NATURAL SEEPAGE, SOURCES, MOVEMENT, FATE, SEA SURFACE, PHYSICAL ASPECTS, SANTA BARBARA CHANNEL, *OCEANOGRAPHY
1093 " NATURAL SEEPAGE, DISTRIBUTION, SOURCES, TAR, HYDROCARBONS , CHEMICAL ANALYSIS, FATE, SANTA BARBARA CHANNEL
1094 " BIOLOGICAL EFFECTS, NATURAL SEEPAGE, TAR, CRUDE OIL, CHEMICAL ANALYSIS, DISTRIBUTION, SOURCES, FATE, OFFSHORE, SANTA BARBARA CHANNEL
1095 " NATURAL SEEPAGE, TAR, COASTAL WATERS, OCS, DISTRIBUTION, SOURCES, FATE, SANTA BARBARA CHANNEL, *GEOLOGY
1118 " EXPLORATION, PRODUCTION, CHEMICAL EFFECTS, NATURAL SEEPAGE, OCS, HYDROCARBONS , SOURCES
1127 " MARINE ORGANISMS, DISTRIBUTION, PLATFORMS, OFFSHORE
1143 " OIL-GAS LEASING, RISK ANALYSIS, OFFSHORE, EXPLORATION, OIL TRANSPORT, SPILL TRAJECTORIES, MODELS
1171 " REFINERIES, WASTEWATER TREATMENT, OIL FIELDS, OXIDATION, COASTAL WATERS
1197 " SEDIMENTS, OFFSHORE, DRILLING, *BARIUM
0800 CANADA, SAMPLING, CHEMICAL ANALYSIS, SEAWATER, CRUDE OIL, SPECTROSCOPY, CONCENTRATIONS, PACIFIC OCEAN
0853 " BIBLIOGRAPHIES, SPILL CLEANUP, DISPERSANTS
0861 " BEAUFORT SEA, ARCTIC, SPILL CLEANUP, SPILL RESPONSE, ICE
0872 " SPILL CONTAINMENT, SPILL CLEANUP, RIVERS, ICE, COLD CLIMATES
0874 " SPILL CLEANUP, SPILL RESPONSE, ONSHORE, FRESHWATER, RIVERS, LAKES
0876 " BIRDS, WILDLIFE, RESTORATION, POLLUTION CONTROL
0877 " PERSONNEL TRAINING, CONTINGENCY PLANNING, GOVERNMENT AGENCIES, US, SPILL RESPONSE, COASTS, *WORKSHOP
0883 " ARCTIC, SPILL RESPONSE, ICE, SPILL CONTAINMENT, SPILL CLEANUP, MONITORING, INCINERATION, *AMOP PROGRAM
0889 " BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, FATE, COLD CLIMATES, US, *WORKSHOP
0890 " BEAUFORT SEA, ARCTIC, SPILL RESPONSE, EQUIPMENT, ICE, SPILL CONTAINMENT, SPILL REMOVAL, MONITORING
0903 " POLLUTION CONTROL, EQUIPMENT, SKIMMERS, SORBENTS, OIL TRANSPORT, SHIPS, IMCO, PERSONNEL TRAINING
0904 " ENVIRONMENTAL EFFECTS, SPILL CLEANUP, COASTAL WATERS, COASTS
0905 " SPILL CLEANUP, SPILL RESPONSE, COASTAL WATERS, COASTS
0907 " POLLUTION CONTROL, SPILL RESPONSES, CONTINGENCY PLANNING, USCG
0908 " ARCTIC, POLLUTION CONTROL, OIL SPILLS, STATISTICS, SPILL RESPONSE
0917 " BIOLOGICAL EFFECTS, ARCTIC, MAMMALS, MORTALITY, *POLAR BEARS
0967 " BIOLOGICAL EFFECTS, BAYS, RECOVERY, RESTORATION, ESTUARIES, SEDIMENTS, *CHEDABUCTO BAY SPILL
0971 " EIS, RISK ANALYSIS, ECONOMICS, SOCIOECONOMIC EFFECTS, PORTS , SPILL RESPONSE, WASHINGTON, PACIFIC COAST
0978 " BLOWOUTS, BASELINE STUDIES, ENVIRONMENTAL EFFECTS, OFFSHORE, EXPLORATION
0999 " BIBLIOGRAPHIES, FATE, ENVIRONMENTAL EFFECTS, MARINE ENVIRONMENT
1008 " BEHAVIOR, ARCTIC, SPILL CLEANUP, ICE, *RESEARCH REVIEW
1048 " BEHAVIOR, PHYSICAL ASPECTS, MOVEMENT, ICE, COLD CLIMATES, *RESEARCH REVIEW
1053 " BEHAVIOR, PHYSICAL ASPECTS, ICE, CONTAMINATION, *KURDISTAN SPILL
1123 " ARCTIC, REGULATIONS, OFFSHORE, EXPLORATION
0801 CARCINOGENS, PAH, SAMPLING, FISH, DISTRIBUTION, CONCENTRATIONS, *CREOSOTE
0944 " BOOK REVIEW, HEALTH HAZARDS, PAH, MICROORGANISMS, MAMMALS
1005 " ENVIRONMENTAL EFFECTS, MARINE ENVIRONMENT, SUBLETHAL EFFECTS, MARINE ORGANISMS, HEALTH HAZARDS, UN
1006 " BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH, CHEMICAL ANALYSIS, CONTAMINATION, METABOLISM, MUTAGENS
0770 CARIBBEAN SEA, CONCENTRATIONS, WSF, HYDROCARBONS , SEAWATER, GULF OF MEXICO, MARINE ORGANISMS

0797 CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, CHEMICAL ANALYSIS, DISTRIBUTION, NATURAL
SEEPAGE, SEAWATER, WEATHERING, CRUDE OIL, NOAA
0753 CHEMICAL ANALISIS, BAYS, MONITORING, HYDROCARBONS , WSF, SAMPLING, COASTS,
DISTRIBUTION, CONTAMINATION, *ADRIATIC SEA
0797 " CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, DISTRIBUTION, NATURAL SEEPAGE, SEAWATER,
WEATHERING, CRUDE OIL, NOAA
0798 " BIOASSAY, CONCENTRATIONS, HYDROCARBONS
0800 " CANADA, SAMPLING, SEAWATER, CRUDE OIL, SPECTROSCOPY, CONCENTRATIONS, PACIFIC OCEAN
0802 " ANALYTICAL TECHNIQUES, SPECTROSCOPY, FRESHWATER, SEAWATER, SOURCE IDENTIFICATION
0807 " BIOLOGICAL EFFECTS, CONTAMINATION, DISTRIBUTION, COASTAL WATERS, HARBORS, MARINE
ORGANISMS, INDIA, *MADRAS
0809 " CHROMATOGRAPHY, PAH, MOLLUSKS, *OYSTERS
0810 " CALIFORNIA, BEACHES, ANALYTICAL TECHNIQUES, NATURAL SEEPAGE, TAR, CRUDE OIL,
COASTAL WATERS
0812 " SOIL, EMULSIONS, SOLUTION, FRESHWATER, GROUNDWATER
0815 " BIOLOGICAL EFFECTS, DRILLING, PLATFORMS, SAMPLING, SEDIMENTS, MARINE ORGANISMS
0818 " CONCENTRATIONS, DISTRIBUTION, MARINE ORGANISMS, MOLLUSKS, SEDIMENTS, *SULFUR
COMPOUNDS
0820 " ANTARCTICA, HYDROCARBONS , PAH, CONCENTRATIONS, CONTAMINATION, SEDIMENTS
0823 " BIOGENIC HYDROCARBONS, DETECTION, HYDROCARBONS , GC/MS, SEDIMENTS, *GULF OF
CALIFORNIA
0824 " BERMUDA, HYDROCARBONS , COASTS, SEDIMENTS, HARBORS, OFFSHORE
0831 " SOURCE IDENTIFICATION, CHROMATOGRAPHY, HYDROCARBONS , EQUIPMENT
1006 " CARCINOGENS, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH,
CONTAMINATION, METABOLISM, MUTAGENS
1093 " CALIFORNIA, NATURAL SEEPAGE, DISTRIBUTION, SOURCES, TAR, HYDROCARBONS , FATE,
SANTA BARBARA CHANNEL
1094 " CALIFORNIA, BIOLOGICAL EFFECTS, NATURAL SEEPAGE, TAR, CRUDE OIL, DISTRIBUTION,
SOURCES, FATE, OFFSHORE, SANTA BARBARA CHANNEL
0833 CHEMICAL EFFECTS, SOURCE IDENTIFICATION, CONTAMINATION, GROUNDWATER, PETROLEUM PRODUCTS
0929 " ARCTIC, CRUDE OIL, SOIL, *TUNDRA, *SOIL RESPIRATION
0955 " BLACK SEA, PHYSICAL EFFECTS, TOXICITY, WSF, *PICAREL
0970 " BASELINE STUDIES, ALASKA , ECOSYSTEMS, MICROORGANISMS, FOOD WEB, OCS, DEVELOPMENT
1009 " BIOLOGICAL EFFECTS, OIL SPILLS, INTERTIDAL ZONE, PHYSICAL EFFECTS, *EXPERIMENTAL
DESIGN
1118 " CALIFORNIA, EXPLORATION, PRODUCTION, NATURAL SEEPAGE, OCS, HYDROCARBONS , SOURCES
1129 " MICROORGANISMS, OIL INDUSTRY, LEGISLATION
0997 CHILE, BEACHES, SEDIMENTS, INTERTIDAL ZONE, ENVIRONMENTAL EFFECTS, *NORTHERN BREEZE
SPILL
0774 CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, PETROLEUM PRODUCTS, SPECTROMETRY, DETECTION
0809 " CHEMICAL ANALYSIS, PAH, MOLLUSKS, *OYSTERS
0828 " SOURCE IDENTIFICATION, TAR, SAMPLING, SEA SURFACE, OIL DISCHARGES, TANKERS,
COASTS, SPAIN, ITALY, MEDITERRANEAN SEA
0831 " CHEMICAL ANALISIS, SOURCE IDENTIFICATION, HYDROCARBONS , EQUIPMENT
0832 " SOURCE IDENTIFICATION, OIL SLICKS, MONITORING, MARINE ORGANISMS, SEDIMENTS
0924 CHRONIC EFFECTS, BIOLOGICAL EFFECTS, MOLLUSKS, REPRODUCTION, MORTALITY, SUBLETHAL
EFFECTS
0925 " ACUTE EFFECTS, MARINE ORGANISMS
0938 " MORTALITY, SUBLETHAL EFFECTS, WSF, FUEL OIL
0941 " CRUDE OIL, MOLLUSKS, ESTUARIES, *OYSTERS
0981 " OIL DISCHARGES, SOCIOECONOMIC EFFECTS, NORWAY, UK, NORTH SEA, REGULATIONS,
EQUIPMENT
1014 " AMOCO CADIZ SPILL, SHORELINES, ENVIRONMENTAL EFFECTS, LIABILITY, COASTS, FRANCE
1101 " CRUDE OIL, WSF, FISH, SUBLETHAL EFFECTS, METABOLISM, *MORPHOLOGICAL CHANGES
1107 " BERING SEA, ALASKA , FISH, CRUDE OIL, CONTAMINATION, SEDIMENTS, COASTAL WATERS, OCS
1112 " ALASKA , ACUTE EFFECTS, TOXICITY, UPTAKE, DEPURATION, SUBLETHAL EFFECTS, MARINE
ORGANISMS, *OCSEAP PROGRAM
1175 COALESCENCE, EMULSIONS, WASTEWATER TREATMENT, EQUIPMENT, FILTRATION,
DESIGN-ENGINEERING, PATENT
1183 " OIL-WATER SEPARATION, PERFORMANCE TESTING, IMCO, FILTRATION, DISPERSION,
EQUIPMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION
1185 " OIL-WATER SEPARATION, WASTEWATERS, FILTRATION, EQUIPMENT, DESIGN-ENGINEERING,
PATENT
0758 COASTAL WATERS, CALIFORNIA, NATURAL SEEPAGE, TAR, DISTRIBUTION, SOURCES, *SANTA MONICA
BAY, *GEOPHYSICS
0759 " CALIFORNIA, NATURAL SEEPAGE, TAR, OCS, STATISTICS, *SEISMICITY
0765 " BENTHOS, SAMPLING, SEDIMENTS, FISH, MOLLUSKS, INVERTEBRATES, PAH, *MALTA
0769 " BEACHES, MONITORING, MARINE ORGANISMS, CONTAMINATION, SUBLETHAL EFFECTS, TOXICITY,
UNEP, MEDITERRANEAN SEA, *MALTA
0778 " REMOTE SENSING, MONITORING, SURVEILLANCE, POLLUTION CONTROL, COASTS, TANKERS,
MEDITERRANEAN SEA, *TURKEY
0789 " REMOTE SENSING, OIL SPILLS, PERFORMANCE TESTING
0803 " BEACHES, DISTRIBUTION, SAMPLING, TAR, ZOOPLANKTON, DRILLING, MEDITERRANEAN SEA,
*NEUSTON

0807 COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, CONTAMINATION, DISTRIBUTION, HARBORS, MARINE ORGANISMS, INDIA, *MADRAS
0810 " CHEMICAL ANALYSIS, CALIFORNIA, BEACHES, ANALYTICAL TECHNIQUES, NATURAL SEEPAGE, TAR, CRUDE OIL
0817 " BLACK SEA, FATE, TAR, WEATHERING, OXIDATION, USSR
0822 " ALASKA , CONCENTRATIONS, HYDROCARBONS , SAMPLING, PORTS , HARBORS, SEDIMENTS, PIPELINES, TANKERS
0851 " BEACHES, SPILL CLEANUP, DISPERSANTS, UK
0879 " CONTINGENCY PLANNING, GUIDELINES, MANUALS, FISHERIES, NEW YORK
0900 " POLLUTION PREVENTION, POLLUTION CONTROL, INTERNATIONAL AGREEMENTS, OIL TRANSPORT, *CONFERENCE, *MIDDLE EAST
0904 " CANADA, ENVIRONMENTAL EFFECTS, SPILL CLEANUP, COASTS
0905 " CANADA, SPILL CLEANUP, SPILL RESPONSE, COASTS
0926 " BARENTS SEA, ALGAE, TOXICITY, INVERTEBRATES
0994 " BENTHOS, AMOCO CADIZ SPILL, ENVIRONMENTAL EFFECTS, FRANCE
1017 " BIODEGRADATION, CONTAMINATION, ENVIRONMENTAL EFFECTS, ESTUARIES, SEDIMENTS, SOURCES, DISTRIBUTION
1066 " BEHAVIOR, PREDICTIONS, MODELS, OIL SLICKS, ESTUARIES, *CIRCULATION MODELING
1069 " SIMULATIONS, FATE, *POLLUTANT DIFFUSION
1070 " MODELS, STATISTICAL ANALYSIS, SPILL TRAJECTORIES, COASTS, GULF OF ALASKA
1095 " CALIFORNIA, NATURAL SEEPAGE, TAR, OCS, DISTRIBUTION, SOURCES, FATE, SANTA BARBARA CHANNEL, *GEOLOGY
1096 " BALLAST , SOURCES, CONTAMINATION, MEDITERRANEAN SEA
1107 " CHRONIC EFFECTS, BERING SEA, ALASKA , FISH, CRUDE OIL, CONTAMINATION, SEDIMENTS, OCS
1171 " CALIFORNIA, REFINERIES, WASTEWATER TREATMENT, OIL FIELDS, OXIDATION
0753 COASTS, CHEMICAL ANALYSIS, BAYS, MONITORING, HYDROCARBONS , WSF, SAMPLING, DISTRIBUTION, CONTAMINATION, *ADRIATIC SEA
0776 " REMOTE SENSING, SURVEILLANCE, NORTH SEA, NORWAY, DESIGN-ENGINEERING, EQUIPMENT, PRODUCT INFORMATION
0778 " COASTAL WATERS, REMOTE SENSING, MONITORING, SURVEILLANCE, POLLUTION CONTROL, TANKERS, MEDITERRANEAN SEA, *TURKEY
0808 " HYDROCARBONS , SAMPLING, DETECTION, CONCENTRATIONS, TANKERS, INDIAN OCEAN
0824 " CHEMICAL ANALYSIS, BERMUDA, HYDROCARBONS , SEDIMENTS, HARBORS, OFFSHORE
0828 " CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR, SAMPLING, SEA SURFACE, OIL DISCHARGES, TANKERS, SPAIN, ITALY, MEDITERRANEAN SEA
0829 " CALIFORNIA, BEACHES, SOURCE IDENTIFICATION, NATURAL SEEPAGE, TAR, SANTA BARBARA CHANNEL, INTERTIDAL ZONE, *ASPHALT DEPOSITS
0877 " CANADA, PERSONNEL TRAINING, CONTINGENCY PLANNING, GOVERNMENT AGENCIES, US, SPILL RESPONSE, *WORKSHOP
0902 " POLLUTION PREVENTION, MONITORING, SPILL RESPONSE, POLLUTION CONTROL, *ARABIAN GULF
0904 " COASTAL WATERS, CANADA, ENVIRONMENTAL EFFECTS, SPILL CLEANUP
0905 " COASTAL WATERS, CANADA, SPILL CLEANUP, SPILL RESPONSE
0931 " BENTHOS, AMOCO CADIZ SPILL, ONSHORE, SAMPLING, INTERTIDAL ZONE, ECOSYSTEMS, FRANCE
0952 " ARCTIC, ALASKA , SEA SURFACE, SPILL TRAJECTORIES, DRIFT, MOVEMENT, ICE, *CURRENTS, *METEOROLOGY
0964 " BEACHES, AMOCO CADIZ SPILL, SOCIOECONOMIC EFFECTS, FRANC[illegible] *TOURISM
0973 " BASELINE STUDIES, RISK ANALYSIS, SEDIMENTATION, SHORELINES, GULF OF ALASKA, *SPILL VULNERABILITY
0989 " BEACHES, AMOCO CADIZ SPILL, ENVIRONMENTAL EFFECTS, FISHERIES, FRANCE
1014 " CHRONIC EFFECTS, AMOCO CADIZ SPILL, SHORELINES, ENVIRONMENTAL EFFECTS, LIABILITY, FRANCE
1025 " BIODEGRADATION, BENTHOS, ANNELIDS, SEDIMENTS, DETECTION, PAH, MICROORGANISMS
1061 " BEACHES, IXTOC 1 BLOWOUT, FATE, GULF OF MEXIC[illegible] SPILL TRAJECTORIES, MODELS
1070 " COASTAL WATERS, MODELS, STATISTICAL ANALYSIS, SPILL TRAJECTORIES, GULF OF ALASKA
1071 " MOVEMENT, DRIFT, SPILL TRAJECTORIES, OIL SLICKS, INDIA
1086 " BEHAVIOR, MODELS, PREDICTIONS, SIMULATIONS, SPILL TRAJECTORIES, ENVIRONMENTAL EFFECTS, NOAA
1089 " DETECTION, IXTOC 1 BLOWOUT, NOAA, USCG, GULF OF MEXICO, *RESEARCH FUNDS
1150 " BEACHES, SHIPS, GREECE, *IRENE SERENADE SPILL
1154 " BEACHES, AMOCO CADIZ SPILL, ENVIRONMENTAL EFFECTS, FRANCE
0780 COLD CLIMATES, REMOTE SENSING, OIL SPILLS, DETECTION, EQUIPMENT, *LASERS
0872 " CANADA, SPILL CONTAINMENT, SPILL CLEANUP, RIVERS, ICE
0886 " SPILL RESPONSE, MANUALS, GUIDELINES, EPA
0889 " CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , CONTINGENCY PLANNING, SPILL RESPONSE, PERSONNEL TRAINING, ICE, FATE, US, *WORKSHOP
0891 " BURNING, SPILL RESPONSE, PERFORMANCE TESTING, ICE
0992 " BIOLOGICAL EFFECTS, BENTHOS, WILDLIFE, LEGISLATION, SOCIOECONOMIC EFFECTS, EKOFISK BLOWOUT, *AIBS, *PROCEEDINGS
1000 " BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR, BAYS, ICE, SPILL RESPONSE
1043 " BUZZARDS BAY, BEHAVIOR, ICE, RIVERS, *ETHEL H SPILL, *HUDSON RIVER
1046 " BEHAVIOR, ARCTIC, PHYSICAL ASPECTS, OIL SLICKS, MODELS, PREDICTIONS, SPILL TRAJECTORIES, ICE, *WORKSHOP PROCEEDINGS
1048 " CANADA, BEHAVIOR, PHYSICAL ASPECTS, MOVEMENT, ICE, *RESEARCH REVIEW
1050 " BEHAVIOR, PHYSICAL ASPECTS, FATE, ICE, *BEAUFORT SEA

1084 COLD CLIMATES, MODELS, PREDICTIONS, MOVEMENT, ICE, INFORMATION SYSTEMS, USCG, CONTINGENCY PLANNING
1108 " BIODEGRADATION, MICROORGANISMS, CRUDE OIL, UPTAKE, SEAWATER, SEDIMENTS
0962 COMPENSATION, ECOSYSTEMS, ENVIRONMENTAL EFFECTS, OIL SPILLS, SOCIOECONOMIC EFFECTS, ECONOMICS
0982 " REGULATIONS, LEGISLATION, LIABILITY
1158 " OIL TRANSPORT, SHIPS, TANKERS, INTERNATIONAL CONVENTIONS, IMCO, REGULATIONS, SAFETY, LIABILITY
1194 " FISHERIES, OIL INDUSTRY, OFFSHORE, NORWAY
0762 CONCENTRATIONS, CONTAMINATION, SOIL, DETECTION, CRUDE OIL
0763 " BLACK SEA, BIODEGRADATION, MONITORING, SAMPLING, MICROORGANISMS, MOLLUSKS, MEDITERRANEAN SEA, USSR
0764 " MONITORING, CONTAMINATION, EQUIPMENT
0770 " CARIBBEAN SEA, WSF, HYDROCARBONS , SEAWATER, GULF OF MEXICO, MARINE ORGANISMS
0773 " MONITORING, HYDROCARBONS , TAR, MEDITERRANEAN SEA, DISTRIBUTION
0798 " CHEMICAL ANALYSIS, BIOASSAY, HYDROCARBONS
0799 " SAMPLING, DISTRIBUTION, HYDROCARBONS , PACIFIC COAST, WASHINGTON, PUGET SOUND
0800 " CHEMICAL ANALYSIS, CANADA, SAMPLING, SEAWATER, CRUDE OIL, SPECTROSCOPY, PACIFIC OCEAN
0801 " CARCINOGENS, PAH, SAMPLING, FISH, DISTRIBUTION, *CREOSOTE
0804 " HYDROCARBONS , WSF, SEA SURFACE, CONTAMINATION, SAMPLING, MEDITERRANEAN SEA
0805 " ATLANTIC COAST, DISTRIBUTION, HYDROCARBONS , SOURCES, SEDIMENTS, OCS, MASSACHUSETTS
0808 " COASTS, HYDROCARBONS , SAMPLING, DETECTION, TANKERS, INDIAN OCEAN
0811 " BERMUDA, SAMPLING, DETECTION, TAR, SEAWATER
0813 " BALTIC SEA, SAMPLING, HYDROCARBONS , SEAWATER, SEDIMENTS
0814 " HYDROCARBONS , SAMPLING, PLATFORMS, DRILLING, OCS, DISTRIBUTION, SEDIMENTS, TEXAS
0818 " CHEMICAL ANALYSIS, DISTRIBUTION, MARINE ORGANISMS, MOLLUSKS, SEDIMENTS, *SULFUR COMPOUNDS
0820 " CHEMICAL ANALYSIS, ANTARCTICA, HYDROCARBONS , PAH, CONTAMINATION, SEDIMENTS
0821 " TAR, SEA SURFACE, CONTAMINATION, SAMPLING, MEDITERRANEAN SEA
0822 " COASTAL WATERS, ALASKA , HYDROCARBONS , SAMPLING, PORTS , HARBORS, SEDIMENTS, PIPELINES, TANKERS
0919 " ALGAE, PETROLEUM PRODUCTS, FUEL OIL, TOXICITY, MORTALITY, *SYNECHOCYSTIS AQUATILIS
0934 " TOXICITY, FUEL OIL, EMULSIONS, ZOOPLANKTON, MORTALITY, *DIESEL OIL, *EURYDICE TRUNCATA
0935 " BIOLOGICAL EFFECTS, PLANTS, CRUDE OIL, *PHOTOSYNTHESIS, *NITZSCHIA PALEA
1022 " BIODEGRADATION, BACTERIA, MEDITERRANEAN SEA, DISTRIBUTION, SEAWATER, SEDIMENTS, *DETERGENTS
1092 " DISTRIBUTION, HYDROCARBONS , SEDIMENTS
1105 " AROMATIC HYDROCARBONS, MARINE ORGANISMS, INVERTEBRATES, UPTAKE, TOXICITY
1134 " PETROLEUM PRODUCTS, ENVIRONMENTAL EFFECTS, TOXICITY, PAH, HYDROCARBONS , FATE, DISTRIBUTION
1140 " OFFSHORE, PRODUCTION, GULF OF MEXICO, ENVIRONMENTAL EFFECTS
1024 CONNECTICUT, BIODEGRADATION, BEACHES, SPILL CLEANUP, CRUDE OIL, SEDIMENTS, SHORELINES, MICROORGANISMS
0753 CONTAMINATION, COASTS, CHEMICAL ANALYSIS, BAYS, MONITORING, HYDROCARBONS , WSF, SAMPLING, DISTRIBUTION, *ADRIATIC SEA
0762 " CONCENTRATIONS, SOIL, DETECTION, CRUDE OIL
0764 " CONCENTRATIONS, MONITORING, EQUIPMENT
0769 " COASTAL WATERS, BEACHES, MONITORING, MARINE ORGANISMS, SUBLETHAL EFFECTS, TOXICITY, UNEP, MEDITERRANEAN SEA, *MALTA
0772 " ANALYTICAL TECHNIQUES, DETECTION, GROUNDWATER
0777 " REMOTE SENSING, DETECTION, *COLOR PHOTOGRAPHY
0790 " REMOTE SENSING, DETECTION, MARINE ENVIRONMENT
0791 " REMOTE SENSING, MONITORING, DETECTION, ICE, *MICROWAVES
0804 " CONCENTRATIONS, HYDROCARBONS , WSF, SEA SURFACE, SAMPLING, MEDITERRANEAN SEA
0807 " COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, DISTRIBUTION, HARBORS, MARINE ORGANISMS, INDIA, *MADRAS
0820 " CONCENTRATIONS, CHEMICAL ANALYSIS, ANTARCTICA, HYDROCARBONS , PAH, SEDIMENTS
0821 " CONCENTRATIONS, TAR, SEA SURFACE, SAMPLING, MEDITERRANEAN SEA
0827 " SOURCE IDENTIFICATION, OIL SPILLS, SWEDEN, OFFSHORE, DRILLING, NATURAL SEEPAGE, ONSHORE, REFINERIES, OIL TRANSFER, TANKERS, SHIPS
0830 " SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, INTERNATIONAL CONVENTIONS, POLLUTION CONTROL, USSR
0833 " CHEMICAL EFFECTS, SOURCE IDENTIFICATION, GROUNDWATER, PETROLEUM PRODUCTS
0915 " ARGO MERCHANT SPILL, TOXICITY, FISH, *COD EGGS
0922 " BIOINDICATORS, MARINE ORGANISMS, NORTH SEA
0937 " BIOLOGICAL EFFECTS, NORTH SEA, PLANKTON
0940 " DETECTION, SUBLETHAL EFFECTS, TOXICITY, WASTEWATERS, FISH, ECOSYSTEMS
0945 " TOXICITY, SUBLETHAL EFFECTS, ESTUARIES, *COPEPODS, *NAPHTHALENE
0959 " ADSORPTION, DISTRIBUTION, PHYSICAL ASPECTS, OIL SLICKS, TAR, SEDIMENTS, SEA SURFACE, MEDITERRANEAN SEA
0993 " MARINE ENVIRONMENT, DETECTION, MONITORING, POLLUTION CONTROL, OIL TRANSPORT, REFINING, *TURKEY
1001 " HYDROCARBONS , MEDITERRANEAN SEA

1002 CONTAMINATION, GROUNDWATER, OIL TRANSFER, HYDROCARBONS
1003 " HYDROCARBONS , MARINE ENVIRONMENT
1006 " CHEMICAL ANALYSIS, CARCINOGENS, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH, METABOLISM, MUTAGENS
1011 " MARINE ENVIRONMENT, PETROLEUM PRODUCTS
1013 " MEDITERRANEAN SEA, MORTALITY, SUBLETHAL EFFECTS, FISHERIES, UN, *FAO
1016 " ECOSYSTEMS, ENVIRONMENTAL EFFECTS, SEDIMENTS, CRUSTACEANS, NARRAGANSETT BAY, MASSACHUSETTS
1017 " COASTAL WATERS, BIODEGRADATION, ENVIRONMENTAL EFFECTS, ESTUARIES, SEDIMENTS, SOURCES, DISTRIBUTION
1032 " BIODEGRADATION, BACTERIA, MARINE ENVIRONMENT
1045 " FATE, LAKES , MARINE ENVIRONMENT
1053 " CANADA, BEHAVIOR, PHYSICAL ASPECTS, ICE, *KURDISTAN SPILL
1074 " MODELS, MARINE ENVIRONMENT, POLLUTION CONTROL, ESTUARIES, DISPERSION
1096 " COASTAL WATERS, BALLAST , SOURCES, MEDITERRANEAN SEA
1099 " BENTHOS, HYDROCARBONS , SEDIMENTS, FOOD WEB, UPTAKE, MARINE DETRITIVORES
1107 " COASTAL WATERS, CHRONIC EFFECTS, BERING SEA, ALASKA , FISH, CRUDE OIL, SEDIMENTS, OCS
1117 " FATE, ENVIRONMENTAL EFFECTS, NOAA, MARINE ENVIRONMENT, ECOSYSTEMS
1137 " OIL INDUSTRY, ENVIRONMENTAL EFFECTS, SOCIOECONOMIC EFFECTS, ONSHORE, OFFSHORE, VENEZUELA
1160 " PIPELINES, OIL SPILLS, NORTH SEA, US
1161 " PIPELINES, STATISTICS, SPILL REMOVAL, OIL INDUSTRY, EUROPE
1163 " PIPELINES, CRUDE OIL, OIL TRANSPORT, TRANS-ALASKA PIPELINE, EUROPE, STATISTICS, OIL SPILLS, SOIL, GROUNDWATER
1189 " OIL-WATER SEPARATION, EQUIPMENT, COST ANALYSIS, PRODUCT INFORMATION, PERFORMANCE TESTING
1195 " BIBLIOGRAPHIES, ENVIRONMENTAL EFFECTS, FINLAND, SWEDEN
0877 CONTINGENCY PLANNING, COASTS, CANADA, PERSONNEL TRAINING, GOVERNMENT AGENCIES, US, SPILL RESPONSE, *WORKSHOP
0879 " COASTAL WATERS, GUIDELINES, MANUALS, FISHERIES, NEW YORK
0881 " SPILL RESPONSE, POLLUTION PREVENTION, NORWAY
0882 " SPILL RESPONSE, UK, ENGLISH CHANNEL, DISPERSANTS, EQUIPMENT
0884 " BEAUFORT SEA, ALASKA , SPILL RESPONSE
0885 " SPILL RESPONSE, POLLUTION CONTROL, SPILL COOPERATIVES, PORTS , HARBORS, NEW YORK
0888 " POLLUTION CONTROL, SPILL RESPONSE, METULA SPILL, *JACOB MAERSK SPILL
0889 " COLD CLIMATES, CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , SPILL RESPONSE, PERSONNEL TRAINING, ICE, FATE, US, *WORKSHOP
0892 " POLLUTION CONTROL, MEDITERRANEAN SEA
0893 " CALIFORNIA, SPILL RESPONSE, GOVERNMENT AGENCIES
0894 " SPILL RESPONSE, UN, *OIL COMBATING CENTRES
0895 " SPILL RESPONSE, SPILL CLEANUP, MANUALS, GUIDELINES, SHORELINES, RESTORATION, EPA
0906 " SPILL CLEANUP, SPILL RESPONSE, EQUIPMENT, PERSONNEL TRAINING, INFORMATION SYSTEMS, FRANCE
0907 " CANADA, POLLUTION CONTROL, SPILL RESPONSES, USCG
1062 " SIMULATIONS, SPILL RESPONSE, EQUIPMENT, INFORMATION SYSTEMS, PERSONNEL TRAINING
1084 " COLD CLIMATES, MODELS, PREDICTIONS, MOVEMENT, ICE, INFORMATION SYSTEMS, USCG
1131 " EKOFISK BLOWOUT, GOVERNMENT AGENCIES, POLLUTION CONTROL, SAFETY, OIL INDUSTRY, NORTH SEA
1146 " ENVIRONMENTAL EFFECTS, OFFSHORE, DEVELOPMENT, PRODUCTION, PLATFORMS, OIL TERMINALS, MONITORING
1165 " PORTS , HARBORS, TANKERS, OIL TRANSFER, SPILL RESPONSE, PERSONNEL TRAINING, UK
0873 COST ANALYSIS, SPILL REMOVAL, SORBENTS, PERFORMANCE TESTING, EQUIPMENT, PRODUCT INFORMATION
1188 " OIL-WATER SEPARATION, MONITORING, EQUIPMENT, PERFORMANCE TESTING, PRODUCT INFORMATION
1189 " CONTAMINATION, OIL-WATER SEPARATION, EQUIPMENT, PRODUCT INFORMATION, PERFORMANCE TESTING
0762 CRUDE OIL, CONTAMINATION, CONCENTRATIONS, SOIL, DETECTION
0797 " CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, DISTRIBUTION, NATURAL SEEPAGE, SEAWATER, WEATHERING, NOAA
0800 " CONCENTRATIONS, CHEMICAL ANALYSIS, CANADA, SAMPLING, SEAWATER, SPECTROSCOPY, PACIFIC OCEAN
0810 " COASTAL WATERS, CHEMICAL ANALYSIS, CALIFORNIA, BEACHES, ANALYTICAL TECHNIQUES, NATURAL SEEPAGE, TAR
0847 " ABSORPTION, SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, *BREGOIL
0852 " BURNING, ARCTIC, SPILL REMOVAL, ENVIRONMENTAL EFFECTS
0855 " SPILL RESPONSE, DISPERSANTS, DISPERSION
0921 " WSF, PLANTS, DEVELOPMENT, *GROWTH INHIBITION
0927 " BIOLOGICAL EFFECTS, DISPERSANTS, CRUSTACEANS, *ACID PHOSPHATASE ACTIVITY, *CATHEPSIN D ACTIVITY, *CRANGON CRANGON L.
0929 " CHEMICAL EFFECTS, ARCTIC, SOIL, *TUNDRA, *SOIL RESPIRATION
0930 " BIRDS, TOXICITY, FUEL OIL, *MALLARD DUCKS, *EMBRYOTOXICITY
0935 " CONCENTRATIONS, BIOLOGICAL EFFECTS, PLANTS, *PHOTOSYNTHESIS, *NITZSCHIA PALEA
0939 " BIRDS, WEATHERING, METABOLISM, *TESTOSTERONE, *GULLS

0941 CRUDE OIL, CHRONIC EFFECTS, MOLLUSKS, ESTUARIES, *OYSTERS
0946 " BIRDS, TOXICITY, GROWTH, HABITATS
0963 " CALIFORNIA, NATURAL SEEPAGE, LUBRICATING OIL, RECYCLING, SANTA BARBARA CHANNEL, *WESSON OIL, *SENSUALITY INDEX
1024 " CONNECTICUT, BIODEGRADATION, BEACHES, SPILL CLEANUP, SEDIMENTS, SHORELINES, MICROORGANISMS
1027 " BIODEGRADATION, BACTERIA, HYDROCARBONS , *ARTHROBACTER SP
1031 " BIODEGRADATION, SEAWATER, MICROORGANISMS, MARINE ORGANISMS, MOLLUSKS, *NEMATODES, *POLYCHAETES, *SUBSTRATES
1033 " BIODEGRADATION, BACTERIA
1034 " BIODEGRADATION, SEAWATER, *STEEL CORROSION RESISTANCE
1040 " BIODEGRADATION, AROMATIC HYDROCARBONS, HYDROCARBONS , MICROORGANISMS, PETROLEUM PRODUCTS, METABOLISM
1054 " BEHAVIOR, ARCTIC, PHYSICAL EFFECTS, ICE, SEAWATER
1056 " BEHAVIOR, EMULSIFICATION, PHYSICAL EFFECTS, *TURBULENCE
1090 " BIOLOGICAL EFFECTS, ATLANTIC OCEAN, TAR, WEATHERING, DISTRIBUTION, *NEUSTONIC PERIPHYTON
1094 " CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, NATURAL SEEPAGE, TAR, DISTRIBUTION, SOURCES, FATE, OFFSHORE, SANTA BARBARA CHANNEL
1101 " CHRONIC EFFECTS, WSF, FISH, SUBLETHAL EFFECTS, METABOLISM, *MORPHOLOGICAL CHANGES
1104 " METABOLISM, MARINE MAMMALS, *SEA OTTERS
1107 " CONTAMINATION, COASTAL WATERS, CHRONIC EFFECTS, BERING SEA, ALASKA , FISH, SEDIMENTS, OCS
1108 " COLD CLIMATES, BIODEGRADATION, MICROORGANISMS, UPTAKE, SEAWATER, SEDIMENTS
1110 " BIRDS, MORTALITY, SUBLETHAL EFFECTS, GULF OF ALASKA, *HERRING GULLS
1115 " BIOLOGICAL EFFECTS, UPTAKE, METABOLISM, FATE, MOVEMENT, WSF, FOOD WEB
1163 " CONTAMINATION, PIPELINES, OIL TRANSPORT, TRANS-ALASKA PIPELINE, EUROPE, STATISTICS, OIL SPILLS, SOIL, GROUNDWATER
1148 CRUDE OIL WASHING, TANKERS, POLLUTION CONTROL
1153 " TANKERS, OIL TANKS, PERSONNEL TRAINING
0927 CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, DISPERSANTS, *ACID PHOSPHATASE ACTIVITY, *CATHEPSIN D ACTIVITY, *CRANGON CRANGON L.
0947 " UPTAKE, PAH, *DAPHNIA, PULEX
1016 " CONTAMINATION, ECOSYSTEMS, ENVIRONMENTAL EFFECTS, SEDIMENTS, NARRAGANSETT BAY, MASSACHUSETTS
1109 " BIOINDICATORS, HYDROCARBONS , SEAWATER, *CANCER MAGISTER, *CHEMORECEPTION
1112 DEPURATION, CHRONIC EFFECTS, ALASKA , ACUTE EFFECTS, TOXICITY, UPTAKE, SUBLETHAL EFFECTS, MARINE ORGANISMS, *OCSEAP PROGRAM
0776 DESIGN-ENGINEERING, COASTS, REMOTE SENSING, SURVEILLANCE, NORTH SEA, NORWAY, EQUIPMENT, PRODUCT INFORMATION
0793 " REMOTE SENSING, DETECTION, OIL SPILLS, USCG, PERFORMANCE TESTING, EQUIPMENT
0834 " BOOMS, BEHAVIOR, SPILL CONTAINMENT, PHYSICAL EFFECTS, EQUIPMENT, PERFORMANCE TESTING
0835 " BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION
0840 " BOOMS, SPILL CONTAINMENT, EQUIPMENT, PRODUCT INFORMATION
0842 " BOOMS, SPILL CONTAINMENT, EQUIPMENT, PRODUCT INFORMATION
0864 " SPILL CLEANUP, SHIPS, POLLUTION CONTROL, WASTEWATER TREATMENT, EMULSIONS, DISPOSAL
0867 " SKIMMERS, EQUIPMENT, PRODUCT INFORMATION
0868 " SPILL DISPOSAL, EQUIPMENT, PRODUCT INFORMATION, SPILL CLEANUP, *DEBRIS DISPOSAL
0869 " BOOMS, SPILL CLEANUP, SKIMMERS, EQUIPMENT, PERFORMANCE TESTING, OIL-WATER SEPARATION, PRODUCT INFORMATION
1157 " TANKERS, REGULATIONS, ECONOMIC EFFECTS, SEGREGATED BALLAST
1175 " COALESCENCE, EMULSIONS, WASTEWATER TREATMENT, EQUIPMENT, FILTRATION, PATENT
1183 " COALESCENCE, OIL-WATER SEPARATION, PERFORMANCE TESTING, IMCO, FILTRATION, DISPERSION, EQUIPMENT, PRODUCT INFORMATION
1185 " COALESCENCE, OIL-WATER SEPARATION, WASTEWATERS, FILTRATION, EQUIPMENT, PATENT
1190 " OIL-WATER SEPARATION, FILTRATION, EQUIPMENT, PRODUCT INFORMATION
1196 " OIL TERMINALS, UK, ENVIRONMENTAL EFFECTS, *VISUAL IMPACT
0752 DETECTION, OIL SLICKS, SPILL RESPONSE, EQUIPMENT, PRODUCT INFORMATION, MONITORING, *OIL THICKNESS SENSOR
0755 " SURVEILLANCE, OIL SPILLS, MONITORING
0756 " EQUIPMENT, OIL SPILLS, *LASER FLUORESCENCE
0760 " EQUIPMENT, OIL SLICKS, SEA SURFACE, PERFORMANCE TESTING, PRODUCT INFORMATION
0761 " BIBLIOGRAPHIES, REMOTE SENSING, MONITORING, SURVEILLANCE
0762 " CRUDE OIL, CONTAMINATION, CONCENTRATIONS, SOIL
0766 " SAMPLING, OIL SLICKS, PERSIAN GULF
0768 " OIL SLICKS, PHYSICAL ASPECTS, *LASER FLUOROSENSORS
0771 " EQUIPMENT, OIL SPILLS, *SEWERS
0772 " CONTAMINATION, ANALYTICAL TECHNIQUES, GROUNDWATER
0774 " CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, PETROLEUM PRODUCTS, SPECTROMETRY
0777 " CONTAMINATION, REMOTE SENSING, *COLOR PHOTOGRAPHY
0780 " COLD CLIMATES, REMOTE SENSING, OIL SPILLS, EQUIPMENT, *LASERS
0782 " CALIFORNIA, REMOTE SENSING, MONITORING, NATURAL SEEPAGE, TAR, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY, *OCEANOGRAPHY
0784 " REMOTE SENSING, OIL SPILLS, *LASER-INDUCED LUMINESCENCE

0785 DETECTION, REMOTE SENSING, OIL SLICKS, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, *OCEAN COLOR SCANNER
0790 " CONTAMINATION, REMOTE SENSING, MARINE ENVIRONMENT
0791 " CONTAMINATION, REMOTE SENSING, MONITORING, ICE, *MICROWAVES
0793 " DESIGN-ENGINEERING, REMOTE SENSING, OIL SPILLS, USCG, PERFORMANCE TESTING, EQUIPMENT
0794 " REMOTE SENSING, OIL SLICKS, EQUIPMENT
0795 " REMOTE SENSING, OIL SLICKS, PHYSICAL ASPECTS, *THICKNESS, *FLUORESCENCE
0796 " REMOTE SENSING, OIL SLICKS, MONITORING, ICE, EQUIPMENT
0808 " CONCENTRATIONS, COASTS, HYDROCARBONS , SAMPLING, TANKERS, INDIAN OCEAN
0811 " CONCENTRATIONS, BERMUDA, SAMPLING, TAR, SEAWATER
0823 " CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, HYDROCARBONS , GC/MS, SEDIMENTS, *GULF OF CALIFORNIA
0923 " BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, INTERTIDAL ZONE, INVERTEBRATES, *NEMATODES, *COPEPODS
0940 " CONTAMINATION, SUBLETHAL EFFECTS, TOXICITY, WASTEWATERS, FISH, ECOSYSTEMS
0993 " CONTAMINATION, MARINE ENVIRONMENT, MONITORING, POLLUTION CONTROL, OIL TRANSPORT, REFINING, *TURKEY
1025 " COASTS, BIODEGRADATION, BENTHOS, ANNELIDS, SEDIMENTS, PAH, MICROORGANISMS
1089 " COASTS, IXTOC 1 BLOWOUT, NOAA, USCG, GULF OF MEXICO, *RESEARCH FUNDS
1151 " TANKERS, EQUIPMENT, PRODUCT INFORMATION, *ESTIMATES OF OIL, *SUNKEN TANKERS
1166 " MONITORING, OIL SPILLS, TANKERS, OIL TRANSFER, EQUIPMENT, PRODUCT INFORMATION
0916 DEVELOPMENT, BIRDS, BIOLOGICAL EFFECTS, GROWTH, *EGG HATCHABILITY
0921 " CRUDE OIL, WSF, PLANTS, *GROWTH INHIBITION
0933 " BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, GROWTH, MOLLUSKS, *DENTALIUM EGGS
0970 " CHEMICAL EFFECTS, BASELINE STUDIES, ALASKA , ECOSYSTEMS, MICROORGANISMS, FOOD WEB, OCS
0975 " BASELINE STUDIES, ALASKA , ENVIRONMENTAL EFFECTS, OCS, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0976 " BASELINE STUDIES, ALASKA , ENVIRONMENTAL EFFECTS, OCS, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0979 " BASELINE STUDIES, OCS, OIL-GAS LEASING, EXPLORATION, US, GOVERNMENT AGENCIES, *DEPARTMENT OF THE INTERIOR
1018 " MARINE ENVIRONMENT, OFFSHORE
1058 " BEAUFORT SEA, PREDICTIONS, OIL SPILLS, MOVEMENT, OFFSHORE, *STORM SURGES
1099 " BIRDS, BIOLOGICAL EFFECTS, FUEL OIL, *SEABIRDS, *EGG FORMATION
1102 " BEHAVIOR, SUBLETHAL EFFECTS, FISH, OCS, PACIFIC OCEAN
1116 " BLM, ALASKA , RISK ANALYSIS, OCS, NOAA
1142 " OFFSHORE, SOCIOECONOMIC EFFECTS, ONSHORE, RESOURCE MANAGEMENT, OIL INDUSTRY, ECONOMICS
1144 " BLOWOUTS, USGS, STATISTICS, PLATFORMS, OCS, OFFSHORE, DRILLING
1146 " CONTINGENCY PLANNING, ENVIRONMENTAL EFFECTS, OFFSHORE, PRODUCTION, PLATFORMS, OIL TERMINALS, MONITORING
1199 " OFFSHORE, ONSHORE, OIL INDUSTRY, SCOTLAND, *OIL RELATED UNIVERSITY RESEARCH
0850 DISPERSANTS, EQUIPMENT, PRODUCT INFORMATION
0851 " COASTAL WATERS, BEACHES, SPILL CLEANUP, UK
0853 " CANADA, BIBLIOGRAPHIES, SPILL CLEANUP
0855 " CRUDE OIL, SPILL RESPONSE, DISPERSION
0858 " BIOLOGICAL EFFECTS, SPILL CLEANUP, PRODUCT INFORMATION
0870 " SPILL CLEANUP, EQUIPMENT, *AERIAL APPLICATION
0882 " CONTINGENCY PLANNING, SPILL RESPONSE, UK, ENGLISH CHANNEL, EQUIPMENT
0920 " BEACHES, TOXICITY, SEAWATER, PERFORMANCE TESTING, UK
0927 " CRUSTACEANS, CRUDE OIL, BIOLOGICAL EFFECTS, *ACID PHOSPHATASE ACTIVITY, *CATHEPSIN D ACTIVITY, *CRANGON CRANGON L.
0988 " TORREY CANYON SPILL, IMCO, SPILL RESPONSE
0855 DISPERSION, DISPERSANTS, CRUDE OIL, SPILL RESPONSE
0958 " BEHAVIOR, FATE, OIL SLICKS, *OIL ENTRAINMENT, *WATER COLUMN
0960 " BEHAVIOR, OIL SLICKS, PHYSICAL EFFECTS, *SEA STATE
1074 " CONTAMINATION, MODELS, MARINE ENVIRONMENT, POLLUTION CONTROL, ESTUARIES
1079 " MODELS, PHYSICAL ASPECTS, OIL SPILLS, SEA SURFACE, *BREAKING WAVES
1082 " BEHAVIOR, MODELS, OIL SLICKS, EMULSIFICATION, USN, USCG, *WAVTOP PROGRAM
1183 " DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, PERFORMANCE TESTING, IMCO, FILTRATION, EQUIPMENT, PRODUCT INFORMATION
0836 DISPOSAL , WASTE OIL TREATMENT, SLUDGE , PATENT
0864 " DESIGN-ENGINEERING, SPILL CLEANUP, SHIPS, POLLUTION CONTROL, WASTEWATER TREATMENT, EMULSIONS
1023 " BIODEGRADATION, REFINERIES, WASTE OIL, LAND FARMING, SLUDGE
1136 " OIL INDUSTRY, REFINERIES, US, WASTE TREATMENT, WASTEWATERS, SLUDGE , SOLID WASTES
1139 " OIL INDUSTRY, REFINING, ENVIRONMENTAL EFFECTS, WATER QUALITY, WASTE TREATMENT, RESOURCE MANAGEMENT
1191 " BIBLIOGRAPHIES, WASTE OIL TREATMENT, RECLAMATION, RECYCLING, REUSE, ENVIRONMENTAL EFFECTS
1193 " RECYCLING, WASTE OIL, US, RESOURCE MANAGEMENT
0753 DISTRIBUTION, CONTAMINATION, COASTS, CHEMICAL ANALYSIS, BAYS, MONITORING, HYDROCARBONS , WSF, SAMPLING, *ADRIATIC SEA

0758 DISTRIBUTION, COASTAL WATERS, CALIFORNIA, NATURAL SEEPAGE, TAR, SOURCES, *SANTA MONICA BAY, *GEOPHYSICS
0773 " CONCENTRATIONS, MONITORING, HYDROCARBONS , TAR, MEDITERRANEAN SEA
0786 " CALIFORNIA, BEHAVIOR, REMOTE SENSING, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, FATE, OIL SLICKS, MOVEMENT, *METEOROLOGY, *OCEANOGRAPHY
0797 " CRUDE OIL, CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, NATURAL SEEPAGE, SEAWATER, WEATHERING, NOAA
0799 " CONCENTRATIONS, SAMPLING, HYDROCARBONS , PACIFIC COAST, WASHINGTON, PUGET SOUND
0801 " CONCENTRATIONS, CARCINOGENS, PAH, SAMPLING, FISH, *CREOSOTE
0803 " COASTAL WATERS, BEACHES, SAMPLING, TAR, ZOOPLANKTON, DRILLING, MEDITERRANEAN SEA, *NEUSTON
0805 " CONCENTRATIONS, ATLANTIC COAST, HYDROCARBONS , SOURCES, SEDIMENTS, OCS, MASSACHUSETTS
0806 " BERING SEA, BASELINE STUDIES, FATE, MOVEMENT, GULF OF ALASKA, *SUSPENDED PARTICULATES
0807 " CONTAMINATION, COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, HARBORS, MARINE ORGANISMS, INDIA, *MADRAS
0814 " CONCENTRATIONS, HYDROCARBONS , SAMPLING, PLATFORMS, DRILLING, OCS, SEDIMENTS, TEXAS
0818 " CONCENTRATIONS, CHEMICAL ANALYSIS, MARINE ORGANISMS, MOLLUSKS, SEDIMENTS, *SULFUR COMPOUNDS
0826 " CALIFORNIA, BEACHES, EXPLORATION, PRODUCTION, OFFSHORE, SAMPLING, TAR, NATURAL SEEPAGE, SOURCES, SANTA BARBARA CHANNEL
0959 " CONTAMINATION, ADSORPTION, PHYSICAL ASPECTS, OIL SLICKS, TAR, SEDIMENTS, SEA SURFACE, MEDITERRANEAN SEA
0974 " BASELINE STUDIES, MONITORING, MOLLUSKS, *RAZOR CLAMS
1010 " URQUIOLA SPILL, ENVIRONMENTAL EFFECTS, SEDIMENTATION
1017 " CONTAMINATION, COASTAL WATERS, BIODEGRADATION, ENVIRONMENTAL EFFECTS, ESTUARIES, SEDIMENTS, SOURCES
1019 " BIODEGRADATION, ALASKA , MICROORGANISMS, OCS, *COOK INLET
1022 " CONCENTRATIONS, BIODEGRADATION, BACTERIA, MEDITERRANEAN SEA, SEAWATER, SEDIMENTS, *DETERGENTS
1072 " MODELS, PREDICTIONS, OIL SLICKS, *THICKNESS
1073 " BEHAVIOR, PREDICTIONS, MOVEMENT, SEA SURFACE
1080 " ICE, OIL SPILLS, MOVEMENT, PREDICTIONS, *ICE COMPACTNESS
1090 " CRUDE OIL, BIOLOGICAL EFFECTS, ATLANTIC OCEAN, TAR, WEATHERING, *NEUSTONIC PERIPHYTON
1092 " CONCENTRATIONS, HYDROCARBONS , SEDIMENTS
1093 " CHEMICAL ANALYSIS, CALIFORNIA, NATURAL SEEPAGE, SOURCES, TAR, HYDROCARBONS , FATE, SANTA BARBARA CHANNEL
1094 " CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, NATURAL SEEPAGE, TAR, SOURCES, FATE, OFFSHORE, SANTA BARBARA CHANNEL
1095 " COASTAL WATERS, CALIFORNIA, NATURAL SEEPAGE, TAR, OCS, SOURCES, FATE, SANTA BARBARA CHANNEL, *GEOLOGY
1127 " CALIFORNIA, MARINE ORGANISMS, PLATFORMS, OFFSHORE
1134 " CONCENTRATIONS, PETROLEUM PRODUCTS, ENVIRONMENTAL EFFECTS, TOXICITY, PAH, HYDROCARBONS , FATE
0757 DRIFT, MONITORING, MOVEMENT, OIL SLICKS, REMOTE SENSING, EQUIPMENT, PRODUCT INFORMATION
0910 " BIODEGRADATION, SPILL RESPONSE, SPILL CLEANUP, FATE, MOVEMENT, WEATHERING
0952 " COASTS, ARCTIC, ALASKA , SEA SURFACE, SPILL TRAJECTORIES, MOVEMENT, ICE, *CURRENTS, *METEOROLOGY
0972 " BERING SEA, BASELINE STUDIES, PREDICTIONS, FATE, SPILL TRAJECTORIES, MONITORING, SEA SURFACE, OCS
0980 " BEAUFORT SEA, BASELINE STUDIES, ICE, SPILL TRAJECTORIES, MOVEMENT, *CHUKCHI SEA
1063 " SIMULATIONS, OIL SPILLS, OCS, OIL INDUSTRY, PHYSICAL ASPECTS, SEA SURFACE
1071 " COASTS, MOVEMENT, SPILL TRAJECTORIES, OIL SLICKS, INDIA
0803 DRILLING, DISTRIBUTION, COASTAL WATERS, BEACHES, SAMPLING, TAR, ZOOPLANKTON, MEDITERRANEAN SEA, *NEUSTON
0814 " DISTRIBUTION, CONCENTRATIONS, HYDROCARBONS , SAMPLING, PLATFORMS, OCS, SEDIMENTS, TEXAS
0815 " CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, PLATFORMS, SAMPLING, SEDIMENTS, MARINE ORGANISMS
0827 " CONTAMINATION, SOURCE IDENTIFICATION, OIL SPILLS, SWEDEN, OFFSHORE, NATURAL SEEPAGE, ONSHORE, REFINERIES, OIL TRANSFER, TANKERS, SHIPS
0912 " BLOWOUT PREVENTION, POLLUTION CONTROL, OIL INDUSTRY, PLATFORMS, PERSONNEL TRAINING, SAFETY, *[illegible]
1111 " BIOLOGICAL EFFECTS, TOXICITY
1125 " ENVIRONMENTAL EFFECTS, OFFSHORE, PRODUCTION, ESTUARIES, ECOSYSTEMS, GULF OF MEXICO, LOUISIANA
1144 " DEVELOPMENT, BLOWOUTS, USGS, STATISTICS, PLATFORMS, OCS, OFFSHORE
1197 " CALIFORNIA, SEDIMENTS, OFFSHORE, *BARIUM
0998 ECONOMIC EFFECTS, AMOCO CADIZ SPILL, ENVIRONMENTAL EFFECTS, FRANCE
1157 " DESIGN-ENGINEERING, TANKERS, REGULATIONS, SEGREGATED BALLAST
0899 ECONOMICS, IXTOC 1 BLOWOUT, GULF OF MEXICO, OIL SPILLS, POLLUTION CONTROL, SOCIOECONOMIC EFFECTS
0962 " COMPENSATION, ECOSYSTEMS, ENVIRONMENTAL EFFECTS, OIL SPILLS, SOCIOECONOMIC EFFECTS

0971 ECONOMICS, CANADA, EIS, RISK ANALYSIS, SOCIOECONOMIC EFFECTS, PORTS , SPILL RESPONSE, WASHINGTON, PACIFIC COAST
1101 " ENVIRONMENTAL EFFECTS, OIL INDUSTRY, PETROLEUM PRODUCTS, OIL TRANSPORT
1102 " DEVELOPMENT, OFFSHORE, SOCIOECONOMIC EFFECTS, ONSHORE, RESOURCE MANAGEMENT, OIL INDUSTRY
1192 " WASTE OIL TREATMENT, REFINERIES, REGULATIONS, RECLAMATION, WATER QUALITY, OIL REMOVAL
0931 ECOSYSTEMS, COASTS, BENTHOS, AMOCO CADIZ SPILL, ONSHORE, SAMPLING, INTERTIDAL ZONE, FRANCE
0940 " DETECTION, CONTAMINATION, SUBLETHAL EFFECTS, TOXICITY, WASTEWATERS, FISH
0962 " ECONOMICS, COMPENSATION, ENVIRONMENTAL EFFECTS, OIL SPILLS, SOCIOECONOMIC EFFECTS
0970 " DEVELOPMENT, CHEMICAL EFFECTS, BASELINE STUDIES, ALASKA , MICROORGANISMS, FOOD WEB, OCS
0990 " SOURCES, POLLUTION CONTROL, RED SEA
1016 " CRUSTACEANS, CONTAMINATION, ENVIRONMENTAL EFFECTS, SEDIMENTS, NARRAGANSETT BAY, MASSACHUSETTS
1117 " CONTAMINATION, FATE, ENVIRONMENTAL EFFECTS, NOAA, MARINE ENVIRONMENT
1125 " DRILLING, ENVIRONMENTAL EFFECTS, OFFSHORE, PRODUCTION, ESTUARIES, GULF OF MEXICO, LOUISIANA
0971 EIS, ECONOMICS, CANADA, RISK ANALYSIS, SOCIOECONOMIC EFFECTS, PORTS , SPILL RESPONSE, WASHINGTON, PACIFIC COAST
1132 " ATLANTIC OCEAN, OIL INDUSTRY, FISHERIES, OFFSHORE, PRODUCTION, ENVIRONMENTAL EFFECTS, GEORGES BANK
0992 EKOFISK BLOWOUT, COLD CLIMATES, BIOLOGICAL EFFECTS, BENTHOS, WILDLIFE, LEGISLATION, SOCIOECONOMIC EFFECTS, *AIBS, *PROCEEDINGS
1120 " NORTH SEA, LEGISLATION, REGULATIONS, POLLUTION PREVENTION
1131 " CONTINGENCY PLANNING, GOVERNMENT AGENCIES, POLLUTION CONTROL, SAFETY, OIL INDUSTRY, NORTH SEA
1039 EMULSIFICATION, BIODEGRADATION, SPILL CLEANUP, GROUNDWATER, SOIL, RESTORATION, RECOVERY
1056 " CRUDE OIL, BEHAVIOR, PHYSICAL EFFECTS, *TURBULENCE
1082 " DISPERSION, BEHAVIOR, MODELS, OIL SLICKS, USN, USCG, *WAVTOP PROGRAM
0812 EMULSIONS, CHEMICAL ANALYSIS, SOIL, SOLUTION, FRESHWATER, GROUNDWATER
0864 " DISPOSAL , DESIGN-ENGINEERING, SPILL CLEANUP, SHIPS, POLLUTION CONTROL, WASTEWATER TREATMENT
0934 " CONCENTRATIONS, TOXICITY, FUEL OIL, ZOOPLANKTON, MORTALITY, *DIESEL OIL, *EURYDICE TRUNCATA
1077 " MODELS, PREDICTIONS, DISPERSIONS, OIL SLICKS, SEA SURFACE, *WATER COLUMN
1175 " DESIGN-ENGINEERING, COALESCENCE, WASTEWATER TREATMENT, EQUIPMENT, FILTRATION, PATENT
1178 " WASTE OIL, REFINING, WASTEWATERS, WATER QUALITY, PHYSICAL ASPECTS
1179 " WASTEWATER TREATMENT, SURFACTANTS, FLOTATION, *AERATION
1180 " WASTEWATER TREATMENT, OIL-WATER SEPARATION, PATENT, *MAGNETIC SEPARATION
1184 " OIL-WATER SEPARATION, FILTRATION, WASTE OIL, *MEMBRANES
0882 ENGLISH CHANNEL, DISPERSANTS, CONTINGENCY PLANNING, SPILL RESPONSE, UK, EQUIPMENT
0986 " FRANCE, GOVERNMENT AGENCIES, *TANIO SPILL
0852 ENVIRONMENTAL EFFECTS, CRUDE OIL, BURNING, ARCTIC, SPILL REMOVAL
0904 " COASTS, COASTAL WATERS, CANADA, SPILL CLEANUP
0962 " ECOSYSTEMS, ECONOMICS, COMPENSATION, OIL SPILLS, SOCIOECONOMIC EFFECTS
0975 " DEVELOPMENT, BASELINE STUDIES, ALASKA , OCS, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0976 " DEVELOPMENT, BASELINE STUDIES, ALASKA , OCS, STATISTICS, INFORMATION SYSTEMS, OIL TRANSPORT
0978 " CANADA, BLOWOUTS, BASELINE STUDIES, OFFSHORE, EXPLORATION
0987 " MARINE ORGANISMS, US, *RESEARCH PROGRAMS
0989 " COASTS, BEACHES, AMOCO CADIZ SPILL, FISHERIES, FRANCE
0994 " COASTAL WATERS, BENTHOS, AMOCO CADIZ SPILL, FRANCE
0996 " FATE, OIL SPILLS, MARINE ENVIRONMENT, SPILL CLEANUP, EQUIPMENT
0997 " CHILE, BEACHES, SEDIMENTS, INTERTIDAL ZONE, *NORTHERN BREEZE SPILL
0998 " ECONOMIC EFFECTS, AMOCO CADIZ SPILL, FRANCE
0999 " CANADA, BIBLIOGRAPHIES, FATE, MARINE ENVIRONMENT
1004 " NOAA, USGS, *USNS POTOMAC SPILL, *RESEARCH RESULTS, *GREENLAND FISHERIES INVESTIGATIONS
1005 " CARCINOGENS, MARINE ENVIRONMENT, SUBLETHAL EFFECTS, MARINE ORGANISMS, HEALTH HAZARDS, UK
1007 " SPILL RESPONSE, OFFSHORE, IRELAND
1010 " DISTRIBUTION, URQUIOLA SPILL, SEDIMENTATION
1014 " COASTS, CHRONIC EFFECTS, AMOCO CADIZ SPILL, SHORELINES, LIABILITY, FRANCE
1015 " BIBLIOGRAPHIES, ARCTIC, NOAA, SUBARCTIC REGIONS
1016 " ECOSYSTEMS, CRUSTACEANS, CONTAMINATION, SEDIMENTS, NARRAGANSETT BAY, MASSACHUSETTS
1017 " DISTRIBUTION, CONTAMINATION, COASTAL WATERS, BIODEGRADATION, ESTUARIES, SEDIMENTS, SOURCES
1020 " BIODEGRADATION, UPTAKE, METABOLISM, MICROORGANISMS, MAMMALS
1068 " BEHAVIOR, MODELS, SIMULATIONS, FISHERIES, GEORGES BANK
1096 " COASTS, BEHAVIOR, MODELS, PREDICTIONS, SIMULATIONS, SPILL TRAJECTORIES, NOAA
1117 " ECOSYSTEMS, CONTAMINATION, FATE, NOAA, MARINE ENVIRONMENT

1125 ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DRILLING, OFFSHORE, PRODUCTION, ESTUARIES, GULF OF MEXICO, LOUISIANA
1126 " BLM, OFFSHORE, PRODUCTION, SEDIMENTS, HYDROCARBONS , MARINE ORGANISMS
1128 " OFFSHORE, PLATFORMS, MONITORING, SAFETY, *UNDERWATER INSPECTION
1132 " EIS, ATLANTIC OCEAN, OIL INDUSTRY, FISHERIES, OFFSHORE, PRODUCTION, GEORGES BANK
1133 " IXTOC 1 BLOWOUT, SPILL RESPONSE, EPA
1134 " DISTRIBUTION, CONCENTRATIONS, PETROLEUM PRODUCTS, TOXICITY, PAH, HYDROCARBONS , FATE
1135 " OFFSHORE, PRODUCTION, EUROPE, RESOURCE MANAGEMENT, *EEC
1137 " CONTAMINATION, OIL INDUSTRY, SOCIOECONOMIC EFFECTS, ONSHORE, OFFSHORE, VENEZUELA
1138 " BERMUDA, OFFSHORE, PRODUCTION, PLATFORMS, REFINERIES, SANTA BARBARA CHANNEL, VENEZUELA, GULF OF MEXICO
1139 " DISPOSAL , OIL INDUSTRY, REFINING, WATER QUALITY, WASTE TREATMENT, RESOURCE MANAGEMENT
1140 " CONCENTRATIONS, OFFSHORE, PRODUCTION, GULF OF MEXICO
1141 " ECONOMICS, OIL INDUSTRY, PETROLEUM PRODUCTS, OIL TRANSPORT
1145 " ONSHORE, OFFSHORE, EXPLORATION, PRODUCTION, OIL TRANSPORT, INTERNATIONAL AGREEMENTS, LEGISLATION, WASTE OIL, EUROPE, *UNEP
1146 " DEVELOPMENT, CONTINGENCY PLANNING, OFFSHORE, PRODUCTION, PLATFORMS, OIL TERMINALS, MONITORING
1154 " COASTS, BEACHES, AMOCO CADIZ SPILL, FRANCE
1162 " PIPELINES, PORTS , RISK ANALYSIS, WASHINGTON, PACIFIC COAST
1173 " WASTE TREATMENT, REFINERIES, POLLUTION CONTROL, OIL INDUSTRY, EUROPE
1191 " DISPOSAL , BIBLIOGRAPHIES, WASTE OIL TREATMENT, RECLAMATION, RECYCLING, REUSE
1195 " CONTAMINATION, BIBLIOGRAPHIES, FINLAND, SWEDEN
1196 " DESIGN-ENGINEERING, OIL TERMINALS, UK, *VISUAL IMPACT
0846 EPA, GUIDELINES, MANUALS, SPILL CLEANUP, SHORELINES, SPILL RESPONSE
0886 " COLD CLIMATES, SPILL RESPONSE, MANUALS, GUIDELINES
0895 " CONTINGENCY PLANNING, SPILL RESPONSE, SPILL CLEANUP, MANUALS, GUIDELINES, SHORELINES, RESTORATION
1133 " ENVIRONMENTAL EFFECTS, IXTOC 1 BLOWOUT, SPILL RESPONSE
0751 EQUIPMENT, BALLAST , SPILL CLEANUP, SPILL REMOVAL, MONITORING, PRODUCT INFORMATION
0752 " DETECTION, OIL SLICKS, SPILL RESPONSE, PRODUCT INFORMATION, MONITORING, *OIL THICKNESS SENSOR
0756 " DETECTION, OIL SPILLS, *LASER FLUORESCENCE
0757 " DRIFT, MONITORING, MOVEMENT, OIL SLICKS, REMOTE SENSING, PRODUCT INFORMATION
0760 " DETECTION, OIL SLICKS, SEA SURFACE, PERFORMANCE TESTING, PRODUCT INFORMATION
0764 " CONTAMINATION, CONCENTRATIONS, MONITORING
0767 " WASTEWATERS, SHIPS, TANKERS, MONITORING, PERFORMANCE TESTING, UK
0771 " DETECTION, OIL SPILLS, *SEWERS
0776 " DESIGN-ENGINEERING, COASTS, REMOTE SENSING, SURVEILLANCE, NORTH SEA, NORWAY, PRODUCT INFORMATION
0780 " DETECTION, COLD CLIMATES, REMOTE SENSING, OIL SPILLS, *LASERS
0788 " REMOTE SENSING, OIL SPILLS, PERFORMANCE TESTING
0793 " DETECTION, DESIGN-ENGINEERING, REMOTE SENSING, OIL SPILLS, USCG, PERFORMANCE TESTING
0794 " DETECTION, REMOTE SENSING, OIL SLICKS
0796 " DETECTION, REMOTE SENSING, OIL SLICKS, MONITORING, ICE
0831 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, SOURCE IDENTIFICATION, HYDROCARBONS
0834 " DESIGN-ENGINEERING, BOOMS, BEHAVIOR, SPILL CONTAINMENT, PHYSICAL EFFECTS, PERFORMANCE TESTING
0837 " BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION, *COLLECTANT SPRAYING
0839 " BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION
0840 " DESIGN-ENGINEERING, BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION
0841 " BOOMS, ABSORPTION, SPILL CONTAINMENT, SORBENTS, PRODUCT INFORMATION
0842 " DESIGN-ENGINEERING, BOOMS, SPILL CONTAINMENT, PRODUCT INFORMATION
0843 " BOOMS, SPILL CONTAINMENT, UK, PRODUCT INFORMATION
0844 " SPILL CLEANUP, SHIPS, OIL REMOVAL, OIL-WATER SEPARATION
0845 " SPILL CLEANUP, PERFORMANCE TESTING, SKIMMERS, PRODUCT INFORMATION, *ELENI V SPILL
0848 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0850 " DISPERSANTS, PRODUCT INFORMATION
0854 " SPILL CLEANUP, *GEOPHYSICAL METHODS
0859 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0860 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0862 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0863 " SKIMMERS, SPILL CLEANUP, PRODUCT INFORMATION
0865 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, SORBENTS, *ROPE MOPS
0867 " DESIGN-ENGINEERING, SKIMMERS, PRODUCT INFORMATION
0868 " DESIGN-ENGINEERING, SPILL DISPOSAL, PRODUCT INFORMATION, SPILL CLEANUP, *DEBRIS DISPOSAL
0869 " DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP, SKIMMERS, PERFORMANCE TESTING, OIL-WATER SEPARATION, PRODUCT INFORMATION
0870 " DISPERSANTS, SPILL CLEANUP, *AERIAL APPLICATION
0873 " COST ANALYSIS, SPILL REMOVAL, SORBENTS, PERFORMANCE TESTING, PRODUCT INFORMATION
0878 " PERSONNEL TRAINING, POLLUTION CONTROL, SPILL RESPONSE, UK

0880 EQUIPMENT, SPILL RESPONSE, SPILL CLEANUP, USN, IXTOC 1 BLOWOUT, GULF OF MEXICO, TEXAS, *BURMAH AGATE SPILL
0882 " ENGLISH CHANNEL, DISPERSANTS, CONTINGENCY PLANNING, SPILL RESPONSE, UK
0887 " BEACHES, MANUALS, GUIDELINES, SPILL CLEANUP, PERSONNEL TRAINING, SHORELINES
0890 " CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE, ICE, SPILL CONTAINMENT, SPILL REMOVAL, MONITORING
0903 " CANADA, POLLUTION CONTROL, SKIMMERS, SORBENTS, OIL TRANSPORT, SHIPS, INCO, PERSONNEL TRAINING
0906 " CONTINGENCY PLANNING, SPILL CLEANUP, SPILL RESPONSE, PERSONNEL TRAINING, INFORMATION SYSTEMS, FRANCE
0909 " BLOWOUT PREVENTION, PRODUCT INFORMATION
0913 " POLLUTION PREVENTION, OIL TRANSPORT, EXPLORATION, PRODUCTION, REFINING, STORAGE, LEGISLATION, MANUALS
0981 " CHRONIC EFFECTS, OIL DISCHARGES, SOCIOECONOMIC EFFECTS, NORWAY, UK, NORTH SEA, REGULATIONS
0996 " ENVIRONMENTAL EFFECTS, FATE, OIL SPILLS, MARINE ENVIRONMENT, SPILL CLEANUP
1062 " CONTINGENCY PLANNING, SIMULATIONS, SPILL RESPONSE, INFORMATION SYSTEMS, PERSONNEL TRAINING
1151 " DETECTION, TANKERS, PRODUCT INFORMATION, *ESTIMATES OF OIL, *SUNKEN TANKERS
1166 " DETECTION, MONITORING, OIL SPILLS, TANKERS, OIL TRANSFER, PRODUCT INFORMATION
1175 " EMULSIONS, DESIGN-ENGINEERING, COALESCENCE, WASTEWATER TREATMENT, FILTRATION, PATENT
1183 " DISPERSION, DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, PERFORMANCE TESTING, INCO, FILTRATION, PRODUCT INFORMATION
1185 " DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, WASTEWATERS, FILTRATION, PATENT
1187 " ADSORPTION, OIL-WATER SEPARATION, FLOTATION, FILTRATION, REFINING, OIL INDUSTRY
1188 " COST ANALYSIS, OIL-WATER SEPARATION, MONITORING, PERFORMANCE TESTING, PRODUCT INFORMATION
1189 " COST ANALYSIS, CONTAMINATION, OIL-WATER SEPARATION, PRODUCT INFORMATION, PERFORMANCE TESTING
1190 " DESIGN-ENGINEERING, OIL-WATER SEPARATION, FILTRATION, PRODUCT INFORMATION
0941 ESTUARIES, CRUDE OIL, CHRONIC EFFECTS, MOLLUSKS, *OYSTERS
0945 " CONTAMINATION, TOXICITY, SUBLETHAL EFFECTS, *COPEPODS, *NAPHTHALENE
0967 " CANADA, BIOLOGICAL EFFECTS, BAYS, RECOVERY, RESTORATION, SEDIMENTS, *CHEDABUCTO BAY SPILL
1017 " ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, BIODEGRADATION, SEDIMENTS, SOURCES
1065 " SIMULATIONS, MOVEMENT, OIL SLICKS, ST. LAWRENCE RIVER, SPILL TRAJECTORIES
1066 " COASTAL WATERS, BEHAVIOR, PREDICTIONS, MODELS, OIL SLICKS, *CIRCULATION MODELING
1074 " DISPERSION, CONTAMINATION, MODELS, MARINE ENVIRONMENT, POLLUTION CONTROL
1125 " ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DRILLING, OFFSHORE, PRODUCTION, GULF OF MEXICO, LOUISIANA
0901 EUROPE, BIRDS, SPILL RESPONSE, POLLUTION CONTROL, INTERNATIONAL AGREEMENTS, UK
1012 " ATLANTIC OCEAN, REGULATIONS, MONITORING, FISHERIES
1135 " ENVIRONMENTAL EFFECTS, OFFSHORE, PRODUCTION, RESOURCE MANAGEMENT, *EEC
1145 " ENVIRONMENTAL EFFECTS, ONSHORE, OFFSHORE, EXPLORATION, PRODUCTION, OIL TRANSPORT, INTERNATIONAL AGREEMENTS, LEGISLATION, WASTE OIL, *UNEP
1161 " CONTAMINATION, PIPELINES, STATISTICS, SPILL REMOVAL, OIL INDUSTRY
1163 " CRUDE OIL, CONTAMINATION, PIPELINES, OIL TRANSPORT, TRANS-ALASKA PIPELINE, STATISTICS, OIL SPILLS, SOIL, GROUNDWATER
1173 " ENVIRONMENTAL EFFECTS, WASTE TREATMENT, REFINERIES, POLLUTION CONTROL, OIL INDUSTRY
1198 " ANTARCTICA, OFFSHORE, ONSHORE, EXPLORATION, INTERNATIONAL CONVENTIONS
1042 EVAPORATION, HYDROCARBONS , FATE, PHYSICAL ASPECTS
1059 " BEHAVIOR, MODELS, SIMULATIONS, OIL INDUSTRY, OIL SLICKS, MOVEMENT, SPREADING
0826 EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, PRODUCTION, OFFSHORE, SAMPLING, TAR, NATURAL SEEPAGE, SOURCES, SANTA BARBARA CHANNEL
0913 " EQUIPMENT, POLLUTION PREVENTION, OIL TRANSPORT, PRODUCTION, REFINING, STORAGE, LEGISLATION, MANUALS
0978 " ENVIRONMENTAL EFFECTS, CANADA, BLOWOUTS, BASELINE STUDIES, OFFSHORE
0979 " DEVELOPMENT, BASELINE STUDIES, OCS, OIL-GAS LEASING, US, GOVERNMENT AGENCIES, *DEPARTMENT OF THE INTERIOR
1118 " CHEMICAL EFFECTS, CALIFORNIA, PRODUCTION, NATURAL SEEPAGE, OCS, HYDROCARBONS , SOURCES
1123 " CANADA, ARCTIC, REGULATIONS, OFFSHORE
1130 " BLOWOUT PREVENTION, ARCTIC, OFFSHORE, PLATFORMS, ICE, *ARTIFICIAL ICE PLATFORMS
1143 " CALIFORNIA, OIL-GAS LEASING, RISK ANALYSIS, OFFSHORE, OIL TRANSPORT, SPILL TRAJECTORIES, MODELS
1145 " EUROPE, ENVIRONMENTAL EFFECTS, ONSHORE, OFFSHORE, PRODUCTION, OIL TRANSPORT, INTERNATIONAL AGREEMENTS, LEGISLATION, WASTE OIL, *UNEP
1198 " EUROPE, ANTARCTICA, OFFSHORE, ONSHORE, INTERNATIONAL CONVENTIONS
0786 FATE, DISTRIBUTION, CALIFORNIA, BEHAVIOR, REMOTE SENSING, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, OIL SLICKS, MOVEMENT, *METEOROLOGY, *OCEANOGRAPHY
0806 " DISTRIBUTION, BERING SEA, BASELINE STUDIES, MOVEMENT, GULF OF ALASKA, *SUSPENDED PARTICULATES

0817 FATE, COASTAL WATERS, BLACK SEA, TAR, WEATHERING, OXIDATION, USSR
0889 " CONTINGENCY PLANNING, COLD CLIMATES, CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , SPILL RESPONSE, PERSONNEL TRAINING, ICE, US, *WORKSHOP
0910 " DRIFT, BIODEGRADATION, SPILL RESPONSE, SPILL CLEANUP, MOVEMENT, WEATHERING
0958 " DISPERSION, BEHAVIOR, OIL SLICKS, *OIL ENTRAINMENT, *WATER COLUMN
0972 " DRIFT, BERING SEA, BASELINE STUDIES, PREDICTIONS, SPILL TRAJECTORIES, MONITORING, SEA SURFACE, OCS
0996 " EQUIPMENT, ENVIRONMENTAL EFFECTS, OIL SPILLS, MARINE ENVIRONMENT, SPILL CLEANUP
0999 " ENVIRONMENTAL EFFECTS, CANADA, BIBLIOGRAPHIES, MARINE ENVIRONMENT
1042 " EVAPORATION, HYDROCARBONS , PHYSICAL ASPECTS
1045 " CONTAMINATION, LAKES , MARINE ENVIRONMENT
1047 " CALIFORNIA, BEHAVIOR, NATURAL SEEPAGE, SOURCES, MOVEMENT, SEA SURFACE, PHYSICAL ASPECTS, SANTA BARBARA CHANNEL, *OCEANOGRAPHY
1049 " BEHAVIOR, ARCTIC, ICE, SPREADING
1050 " COLD CLIMATES, BEHAVIOR, PHYSICAL ASPECTS, ICE, *BEAUFORT SEA
1051 " BEHAVIOR, PHYSICAL ASPECTS, SPREADING, OIL SLICKS
1052 " BEHAVIOR, ALASKA , MOVEMENT, ICE, PRUDHOE BAY
1055 " BEHAVIOR, PHYSICAL ASPECTS, ICE
1057 " PHYSICAL ASPECTS, WEATHERING, FUEL OIL, GROUNDWATER
1061 " COASTS, BEACHES, IXTOC 1 BLOWOUT, GULF OF MEXICO, SPILL TRAJECTORIES, MODELS
1069 " COASTAL WATERS, SIMULATIONS, *POLLUTANT DIFFUSION
1083 " BEHAVIOR, MODELS, SIMULATIONS, PHYSICAL EFFECTS, OIL SPILLS
1093 " DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, NATURAL SEEPAGE, SOURCES, TAR, HYDROCARBONS , SANTA BARBARA CHANNEL
1094 " DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, NATURAL SEEPAGE, TAR, SOURCES, OFFSHORE, SANTA BARBARA CHANNEL
1095 " DISTRIBUTION, COASTAL WATERS, CALIFORNIA, NATURAL SEEPAGE, TAR, OCS, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY
1113 " ARCTIC, METABOLISM, FISH, HYDROCARBONS , *TRACE METAL EFFECTS
1115 " CRUDE OIL, BIOLOGICAL EFFECTS, UPTAKE, METABOLISM, MOVEMENT, WSF, FOOD WEB
1117 " ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CONTAMINATION, NOAA, MARINE ENVIRONMENT
1134 " ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONCENTRATIONS, PETROLEUM PRODUCTS, TOXICITY, PAH, HYDROCARBONS
1170 FILTRATION, AMOCO CADIZ SPILL, WASTE OIL, SPILL REMOVAL, SPILL DISPOSAL, OIL TRANSPORT, REUSE
1172 " WASTEWATERS, OIL-WATER SEPARATION
1175 " EQUIPMENT, EMULSIONS, DESIGN-ENGINEERING, COALESCENCE, WASTEWATER TREATMENT, PATENT
1181 " WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, FLOTATION, PATENT, *COAGULATION
1182 " WASTE OIL TREATMENT, SLUDGE , PATENT, *SOLIDIFICATION
1183 " EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, PERFORMANCE TESTING, INCO, PRODUCT INFORMATION
1184 " EMULSIONS, OIL-WATER SEPARATION, WASTE OIL, *MEMBRANES
1185 " EQUIPMENT, DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, WASTEWATERS, PATENT
1187 " EQUIPMENT, ADSORPTION, OIL-WATER SEPARATION, FLOTATION, REFINING, OIL INDUSTRY
1190 " EQUIPMENT, DESIGN-ENGINEERING, OIL-WATER SEPARATION, PRODUCT INFORMATION
1195 FINLAND, ENVIRONMENTAL EFFECTS, CONTAMINATION, BIBLIOGRAPHIES, SWEDEN
0765 FISH, COASTAL WATERS, BENTHOS, SAMPLING, SEDIMENTS, MOLLUSKS, INVERTEBRATES, PAH, *MALTA
0801 " DISTRIBUTION, CONCENTRATIONS, CARCINOGENS, PAH, SAMPLING, *CREOSOTE
0915 " CONTAMINATION, ARGO MERCHANT SPILL, TOXICITY, *COD EGGS
0940 " ECOSYSTEMS, DETECTION, CONTAMINATION, SUBLETHAL EFFECTS, TOXICITY, WASTEWATERS
0949 " TOXICITY, MARINE ORGANISMS, *DIATOMS, *GELLING COMPOUNDS
1100 " HYDROCARBONS , PAH, METABOLISM, UPTAKE, *SALMON
1101 " CRUDE OIL, CHRONIC EFFECTS, WSF, SUBLETHAL EFFECTS, METABOLISM, *MORPHOLOGICAL CHANGES
1102 " DEVELOPMENT, BEHAVIOR, SUBLETHAL EFFECTS, OCS, PACIFIC OCEAN
1106 " BEHAVIOR, UPTAKE, METABOLISM, SUBLETHAL EFFECTS, *BIOTRANSFORMATION, *TRACE METAL EFFECTS
1107 " CRUDE OIL, CONTAMINATION, COASTAL WATERS, CHRONIC EFFECTS, BERING SEA, ALASKA , SEDIMENTS, OCS
1113 " FATE, ARCTIC, METABOLISM, HYDROCARBONS , *TRACE METAL EFFECTS
1186 " BIOASSAY, OIL-WATER SEPARATION, REGULATIONS, WASTEWATERS, OIL DISCHARGES, MOLLUSKS
0879 FISHERIES, CONTINGENCY PLANNING, COASTAL WATERS, GUIDELINES, MANUALS, NEW YORK
0989 " ENVIRONMENTAL EFFECTS, COASTS, BEACHES, AMOCO CADIZ SPILL, FRANCE
1012 " EUROPE, ATLANTIC OCEAN, REGULATIONS, MONITORING
1013 " CONTAMINATION, MEDITERRANEAN SEA, MORTALITY, SUBLETHAL EFFECTS, UN, *FAO
1068 " ENVIRONMENTAL EFFECTS, BEHAVIOR, MODELS, SIMULATIONS, GEORGES BANK
1119 " SOCIOECONOMIC EFFECTS, PIPELINES, OIL INDUSTRY, UK, *SHETLAND ISLANDS
1122 " REGULATIONS, UK, OFFSHORE, OIL INDUSTRY
1132 " ENVIRONMENTAL EFFECTS, EIS, ATLANTIC OCEAN, OIL INDUSTRY, OFFSHORE, PRODUCTION, GEORGES BANK
1194 " COMPENSATION, OIL INDUSTRY, OFFSHORE, NORWAY
1179 FLOTATION, EMULSIONS, WASTEWATER TREATMENT, SURFACTANTS, *AERATION
1181 " FILTRATION, WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, PATENT, *COAGULATION

1187 FLOTATION, FILTRATION, EQUIPMENT, ADSORPTION, OIL-WATER SEPARATION, REFINING, OIL INDUSTRY
0970 FOOD WEB, ECOSYSTEMS, DEVELOPMENT, CHEMICAL EFFECTS, BASELINE STUDIES, ALASKA , MICROORGANISMS, OCS
1098 " CONTAMINATION, BENTHOS, HYDROCARBONS , SEDIMENTS, UPTAKE, MARINE DETRITIVORES
1115 " FATE, CRUDE OIL, BIOLOGICAL EFFECTS, UPTAKE, METABOLISM, MOVEMENT, WSF
0906 FRANCE, EQUIPMENT, CONTINGENCY PLANNING, SPILL CLEANUP, SPILL RESPONSE, PERSONNEL TRAINING, INFORMATION SYSTEMS
0931 " ECOSYSTEMS, COASTS, BENTHOS, AMOCO CADIZ SPILL, ONSHORE, SAMPLING, INTERTIDAL ZONE
0964 " COASTS, BEACHES, AMOCO CADIZ SPILL, SOCIOECONOMIC EFFECTS, *TOURISM
0986 " ENGLISH CHANNEL, GOVERNMENT AGENCIES, *TANIO SPILL
0989 " FISHERIES, ENVIRONMENTAL EFFECTS, COASTS, BEACHES, AMOCO CADIZ SPILL
0994 " ENVIRONMENTAL EFFECTS, COASTAL WATERS, BENTHOS, AMOCO CADIZ SPILL
0998 " ENVIRONMENTAL EFFECTS, ECONOMIC EFFECTS, AMOCO CADIZ SPILL
1014 " ENVIRONMENTAL EFFECTS, COASTS, CHRONIC EFFECTS, AMOCO CADIZ SPILL, SHORELINES, LIABILITY
1154 " ENVIRONMENTAL EFFECTS, COASTS, BEACHES, AMOCO CADIZ SPILL
0802 FRESHWATER, CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES, SPECTROSCOPY, SEAWATER, SOURCE IDENTIFICATION
0812 " EMULSIONS, CHEMICAL ANALYSIS, SOIL, SOLUTION, GROUNDWATER
0866 " OIL REMOVAL, OIL-WATER SEPARATION, WSF, HYDROCARBONS , RIVERS, *AERATION
0874 " CANADA, SPILL CLEANUP, SPILL RESPONSE, ONSHORE, RIVERS, LAKES
0919 FUEL OIL, CONCENTRATIONS, ALGAE, PETROLEUM PRODUCTS, TOXICITY, MORTALITY, *SYNECHOCYSTIS AQUATILIS
0930 " CRUDE OIL, BIRDS, TOXICITY, *MALLARD DUCKS, *EMBRYOTOXICITY
0932 " BIRDS, BIOLOGICAL EFFECTS, MORTALITY, *INCUBATING GULLS
0934 " EMULSIONS, CONCENTRATIONS, TOXICITY, ZOOPLANKTON, MORTALITY, *DIESEL OIL, *EURYDICE TRUNCATA
0938 " CHRONIC EFFECTS, MORTALITY, SUBLETHAL EFFECTS, WSF
1057 " FATE, PHYSICAL ASPECTS, WEATHERING, GROUNDWATER
1099 " DEVELOPMENT, BIRDS, BIOLOGICAL EFFECTS, *SEABIRDS, *EGG FORMATION
0823 GC/MS, DETECTION, CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, HYDROCARBONS , SEDIMENTS, *GULF OF CALIFORNIA
1068 GEORGES BANK, FISHERIES, ENVIRONMENTAL EFFECTS, BEHAVIOR, MODELS, SIMULATIONS
1132 " FISHERIES, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC OCEAN, OIL INDUSTRY, OFFSHORE, PRODUCTION
0877 GOVERNMENT AGENCIES, CONTINGENCY PLANNING, COASTS, CANADA, PERSONNEL TRAINING, US, SPILL RESPONSE, *WORKSHOP
0893 " CONTINGENCY PLANNING, CALIFORNIA, SPILL RESPONSE
0979 " EXPLORATION, DEVELOPMENT, BASELINE STUDIES, OCS, OIL-GAS LEASING, US, *DEPARTMENT OF THE INTERIOR
0986 " FRANCE, ENGLISH CHANNEL, *TANIO SPILL
1131 " EKOFISK BLOWOUT, CONTINGENCY PLANNING, POLLUTION CONTROL, SAFETY, OIL INDUSTRY, NORTH SEA
1147 " BIRDS, ALASKA , SHIPS, SPILL CLEANUP, MONITORING, *USFWS
1164 GRAVITY SEPARATION, PORTS , WASTEWATER TREATMENT, SHIPS, OREGON
0772 GROUNDWATER, DETECTION, CONTAMINATION, ANALYTICAL TECHNIQUES
0812 " FRESHWATER, EMULSIONS, CHEMICAL ANALYSIS, SOIL, SOLUTION
0833 " CONTAMINATION, CHEMICAL EFFECTS, SOURCE IDENTIFICATION, PETROLEUM PRODUCTS
1002 " CONTAMINATION, OIL TRANSFER, HYDROCARBONS
1039 " EMULSIFICATION, BIODEGRADATION, SPILL CLEANUP, SOIL, RESTORATION, RECOVERY
1057 " FUEL OIL, FATE, PHYSICAL ASPECTS, WEATHERING
1163 " EUROPE, CRUDE OIL, CONTAMINATION, PIPELINES, OIL TRANSPORT, TRANS-ALASKA PIPELINE, STATISTICS, OIL SPILLS, SOIL
0916 GROWTH, DEVELOPMENT, BIRDS, BIOLOGICAL EFFECTS, *EGG HATCHABILITY
0933 " DEVELOPMENT, BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, MOLLUSKS, *DENTALIUM EGGS
0946 " CRUDE OIL, BIRDS, TOXICITY, HABITATS
1030 " BIODEGRADATION, MICROORGANISMS, SURFACTANTS, HYDROCARBONS
0846 GUIDELINES, EPA, MANUALS, SPILL CLEANUP, SHORELINES, SPILL RESPONSE
0879 " FISHERIES, CONTINGENCY PLANNING, COASTAL WATERS, MANUALS, NEW YORK
0886 " EPA, COLD CLIMATES, SPILL RESPONSE, MANUALS
0887 " EQUIPMENT, BEACHES, MANUALS, SPILL CLEANUP, PERSONNEL TRAINING, SHORELINES
0895 " EPA, CONTINGENCY PLANNING, SPILL RESPONSE, SPILL CLEANUP, MANUALS, SHORELINES, RESTORATION
1091 " INFORMATION SYSTEMS, MANUALS, SPILL RESPONSE, PREDICTIONS, MODELS, SPILL TRAJECTORIES, *CLIMATOLOGICAL ATLAS
1121 " OIL INDUSTRY, REGULATIONS, REFINERIES, TANKERS
0806 GULF OF ALASKA, FATE, DISTRIBUTION, BERING SEA, BASELINE STUDIES, MOVEMENT, *SUSPENDED PARTICULATES
0973 " COASTS, BASELINE STUDIES, RISK ANALYSIS, SEDIMENTATION, SHORELINES, *SPILL VULNERABILITY
0977 " BIODEGRADATION, BASELINE STUDIES, MICROORGANISMS, SEDIMENTS
1064 " PREDICTIONS, RISK ANALYSIS, OIL-GAS LEASING, OCS, *KODIAK ISLAND LEASE AREA
1070 " COASTS, COASTAL WATERS, MODELS, STATISTICAL ANALYSIS, SPILL TRAJECTORIES
1087 " RISK ANALYSIS, PREDICTIONS, OIL-GAS LEASING, OCS, *KODIAK ISLAND LEASE AREA

1110 GULF OF ALASKA, CRUDE OIL, BIRDS, MORTALITY, SUBLETHAL EFFECTS, *HERRING GULLS
0770 GULF OF MEXICO, CONCENTRATIONS, CARIBBEAN SEA, WSF, HYDROCARBONS , SEAWATER, MARINE ORGANISMS
0793 " REMOTE SENSING, IXTOC 1 SPILL, SURVEILLANCE, MONITORING, *LANDSAT
0880 " EQUIPMENT, SPILL RESPONSE, SPILL CLEANUP, USN, IXTOC 1 BLOWOUT, TEXAS, *BURMAH AGATE SPILL
0898 " BLOWOUTS, IXTOC 1 BLOWOUT, MEXICO
0899 " ECONOMICS, IXTOC 1 BLOWOUT, OIL SPILLS, POLLUTION CONTROL, SOCIOECONOMIC EFFECTS
1061 " FATE, COASTS, BEACHES, IXTOC 1 BLOWOUT, SPILL TRAJECTORIES, MODELS
1089 " DETECTION, COASTS, IXTOC 1 BLOWOUT, NOAA, USCG, *RESEARCH FUNDS
1103 " BACTERIA, OIL FIELDS, OCS, PLATFORMS, TOXICITY, SAMPLING
1125 " ESTUARIES, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DRILLING, OFFSHORE, PRODUCTION, LOUISIANA
1138 " ENVIRONMENTAL EFFECTS, BERMUDA, OFFSHORE, PRODUCTION, PLATFORMS, REFINERIES, SANTA BARBARA CHANNEL, VENEZUELA
1140 " ENVIRONMENTAL EFFECTS, CONCENTRATIONS, OFFSHORE, PRODUCTION
1149 " TANKERS, OIL SPILLS, *ISTANBUL
0946 HABITATS, GROWTH, CRUDE OIL, BIRDS, TOXICITY
0807 HARBORS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, MARINE ORGANISMS, INDIA, *MADRAS
0822 " CONCENTRATIONS, COASTAL WATERS, ALASKA , HYDROCARBONS , SAMPLING, PORTS , SEDIMENTS, PIPELINES, TANKERS
0824 " COASTS, CHEMICAL ANALYSIS, BERMUDA, HYDROCARBONS , SEDIMENTS, OFFSHORE
0885 " CONTINGENCY PLANNING, SPILL RESPONSE, POLLUTION CONTROL, SPILL COOPERATIVES, PORTS , NEW YORK
1165 " CONTINGENCY PLANNING, PORTS , TANKERS, OIL TRANSFER, SPILL RESPONSE, PERSONNEL TRAINING, UK
0944 HEALTH HAZARDS, CARCINOGENS, BOOK REVIEW, PAH, MICROORGANISMS, MAMMALS
1005 " ENVIRONMENTAL EFFECTS, CARCINOGENS, MARINE ENVIRONMENT, SUBLETHAL EFFECTS, MARINE ORGANISMS, UN
1114 " OIL INDUSTRY, REFINERIES, MORTALITY, STATISTICAL ANALYSIS, *REFINERY WORKERS
0753 HYDROCARBONS , DISTRIBUTION, CONTAMINATION, COASTS, CHEMICAL ANALYSIS, BAYS, MONITORING, WSF, SAMPLING, *ADRIATIC SEA
0770 " GULF OF MEXICO, CONCENTRATIONS, CARIBBEAN SEA, WSF, SEAWATER, MARINE ORGANISMS
0773 " DISTRIBUTION, CONCENTRATIONS, MONITORING, TAR, MEDITERRANEAN SEA
0775 " REMOTE SENSING, OIL SLICKS, OIL DISCHARGES, SHIPS, TANKERS,NATURAL SEEPAGE
0798 " CONCENTRATIONS, CHEMICAL ANALYSIS, BIOASSAY
0799 " DISTRIBUTION, CONCENTRATIONS, SAMPLING, PACIFIC COAST, WASHINGTON, PUGET SOUND
0804 " CONTAMINATION, CONCENTRATIONS, WSF, SEA SURFACE, SAMPLING, MEDITERRANEAN SEA
0805 " DISTRIBUTION, CONCENTRATIONS, ATLANTIC COAST, SOURCES, SEDIMENTS, OCS, MASSACHUSETTS
0808 " DETECTION, CONCENTRATIONS, COASTS, SAMPLING, TANKERS, INDIAN OCEAN
0813 " CONCENTRATIONS, BALTIC SEA, SAMPLING, SEAWATER, SEDIMENTS
0814 " DRILLING, DISTRIBUTION, CONCENTRATIONS, SAMPLING, PLATFORMS, OCS, SEDIMENTS, TEXAS
0820 " CONTAMINATION, CONCENTRATIONS, CHEMICAL ANALYSIS, ANTARCTICA, PAH, SEDIMENTS
0822 " HARBORS, CONCENTRATIONS, COASTAL WATERS, ALASKA , SAMPLING, PORTS , SEDIMENTS, PIPELINES, TANKERS
0823 " GC/MS, DETECTION, CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, SEDIMENTS, *GULF OF CALIFORNIA
0824 " HARBORS, COASTS, CHEMICAL ANALYSIS, BERMUDA, SEDIMENTS, OFFSHORE
0831 " EQUIPMENT, CHROMATOGRAPHY, CHEMICAL ANALYSIS, SOURCE IDENTIFICATION
0866 " FRESHWATER, OIL REMOVAL, OIL-WATER SEPARATION, WSF, RIVERS, *AERATION
0950 " BIOLOGICAL EFFECTS, TOXICITY, MUTAGENS, WEATHERING
0954 " ADSORPTION, SEDIMENTS, PHYSICAL ASPECTS, TAR, *AUTOPURIFICATION
0968 " BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES, MICROORGANISMS, OCS
1001 " CONTAMINATION, MEDITERRANEAN SEA
1002 " GROUNDWATER, CONTAMINATION, OIL TRANSFER
1003 " CONTAMINATION, MARINE ENVIRONMENT
1027 " CRUDE OIL, BIODEGRADATION, BACTERIA, *ARTHROBACTER SP
1030 " GROWTH, BIODEGRADATION, MICROORGANISMS, SURFACTANTS
1035 " BIODEGRADATION, TOXICITY, UPTAKE, OXIDATION, *ALIPHATICS
1036 " BIODEGRADATION, MICROORGANISMS, METABOLISM, *ALICYCLIC HYDROCARBONS
1040 " CRUDE OIL, BIODEGRADATION, AROMATIC HYDROCARBONS, MICROORGANISMS, PETROLEUM PRODUCTS, METABOLISM
1041 " BIODEGRADATION, MICROORGANISMS, *GENETICS
1042 " FATE, EVAPORATION, PHYSICAL ASPECTS
1092 " DISTRIBUTION, CONCENTRATIONS, SEDIMENTS
1093 " FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, NATURAL SEEPAGE, SOURCES, TAR, SANTA BARBARA CHANNEL
1098 " FOOD WEB, CONTAMINATION, BENTHOS, SEDIMENTS, UPTAKE, MARINE DETRITIVORES
1100 " FISH, PAH, METABOLISM, UPTAKE, *SALMON
1109 " CRUSTACEANS, BIOINDICATORS, SEAWATER, *CANCER MAGISTER, *CHEMORECEPTION
1113 " FISH, FATE, ARCTIC, METABOLISM, *TRACE METAL EFFECTS
1119 " EXPLORATION, CHEMICAL EFFECTS, CALIFORNIA, PRODUCTION, NATURAL SEEPAGE, OCS, SOURCES

1126 HYDROCARBONS , ENVIRONMENTAL EFFECTS, BLM, OFFSHORE, PRODUCTION, SEDIMENTS, MARINE ORGANISMS
1134 " FATE, ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONCENTRATIONS, PETROLEUM PRODUCTS, TOXICITY, PAH
0791 ICE, DETECTION, CONTAMINATION, REMOTE SENSING, MONITORING, *MICROWAVES
0796 " EQUIPMENT, DETECTION, REMOTE SENSING, OIL SLICKS, MONITORING
0861 " CANADA, BEAUFORT SEA, ARCTIC, SPILL CLEANUP, SPILL RESPONSE
0872 " COLD CLIMATES, CANADA, SPILL CONTAINMENT, SPILL CLEANUP, RIVERS
0883 " CANADA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, SPILL CLEANUP, MONITORING, INCINERATION, *AMOP PROGRAM
0889 " FATE, CONTINGENCY PLANNING, COLD CLIMATES, CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , SPILL RESPONSE, PERSONNEL TRAINING, US, *WORKSHOP
0890 " EQUIPMENT, CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, SPILL REMOVAL, MONITORING
0891 " COLD CLIMATES, BURNING, SPILL RESPONSE, PERFORMANCE TESTING
0952 " DRIFT, COASTS, ARCTIC, ALASKA , SEA SURFACE, SPILL TRAJECTORIES, MOVEMENT, *CURRENTS, *METEOROLOGY
0957 " BLM, ARCTIC, NOAA, SEA SURFACE, *OIL ENTRAINMENT, *SEASONAL VARIATIONS, *NORCOR/OCS
0980 " DRIFT, BEAUFORT SEA, BASELINE STUDIES, SPILL TRAJECTORIES, MOVEMENT, *CHUKCHI SEA
1000 " COLD CLIMATES, BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR, BAYS, SPILL RESPONSE
1008 " CANADA, BEHAVIOR, ARCTIC, SPILL CLEANUP, *RESEARCH REVIEW
1043 " COLD CLIMATES, BUZZARDS BAY, BEHAVIOR, RIVERS, *ETHEL H SPILL, *HUDSON RIVER
1046 " COLD CLIMATES, BEHAVIOR, ARCTIC, PHYSICAL ASPECTS, OIL SLICKS, MODELS, PREDICTIONS, SPILL TRAJECTORIES, *WORKSHOP PROCEEDINGS
1048 " COLD CLIMATES, CANADA, BEHAVIOR, PHYSICAL ASPECTS, MOVEMENT, *RESEARCH REVIEW
1049 " FATE, BEHAVIOR, ARCTIC, SPREADING
1050 " FATE, COLD CLIMATES, BEHAVIOR, PHYSICAL ASPECTS, *BEAUFORT SEA
1052 " FATE, BEHAVIOR, ALASKA , MOVEMENT, PRUDHOE BAY
1053 " CONTAMINATION, CANADA, BEHAVIOR, PHYSICAL ASPECTS, *KURDISTAN SPILL
1054 " CRUDE OIL, BEHAVIOR, ARCTIC, PHYSICAL EFFECTS, SEAWATER
1055 " FATE, BEHAVIOR, PHYSICAL ASPECTS
1080 " DISTRIBUTION, OIL SPILLS, MOVEMENT, PREDICTIONS, *ICE COMPACTNESS
1084 " CONTINGENCY PLANNING, COLD CLIMATES, MODELS, PREDICTIONS, MOVEMENT, INFORMATION SYSTEMS, USCG
1085 " BEHAVIOR, BEAUFORT SEA, PREDICTIONS, MOVEMENT, SPILL TRAJECTORIES, *CHUKCHI SEA
1130 " EXPLORATION, BLOWOUT PREVENTION, ARCTIC, OFFSHORE, PLATFORMS, *ARTIFICIAL ICE PLATFORMS
0903 IMCO, EQUIPMENT, CANADA, POLLUTION CONTROL, SKIMMERS, SORBENTS, OIL TRANSPORT, SHIPS, PERSONNEL TRAINING
0988 " DISPERSANTS, TORREY CANYON SPILL, SPILL RESPONSE
1155 " BALLAST , TANKERS, REGULATIONS, POLLUTION CONTROL, OIL DISCHARGES
1158 " COMPENSATION, OIL TRANSPORT, SHIPS, TANKERS, INTERNATIONAL CONVENTIONS, REGULATIONS, SAFETY, LIABILITY
1169 " BALLAST , TANKERS, SHIPS, OIL TRANSPORT, POLLUTION CONTROL
1183 " FILTRATION, EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, COALESCENCE, OIL-WATER SEPARATION, PERFORMANCE TESTING, PRODUCT INFORMATION
0883 INCINERATION, ICE, CANADA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, SPILL CLEANUP, MONITORING, *AMOP PROGRAM
0807 INDIA, HARBORS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, MARINE ORGANISMS, *MADRAS
1071 " DRIFT, COASTS, MOVEMENT, SPILL TRAJECTORIES, OIL SLICKS
0808 INDIAN OCEAN, HYDROCARBONS , DETECTION, CONCENTRATIONS, COASTS, SAMPLING, TANKERS
1026 INDUSTRIES, BIODEGRADATION, PETROLEUM PRODUCTS, MICROORGANISMS
0906 INFORMATION SYSTEMS, FRANCE, EQUIPMENT, CONTINGENCY PLANNING, SPILL CLEANUP, SPILL RESPONSE, PERSONNEL TRAINING
0975 " ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA , OCS, STATISTICS, OIL TRANSPORT
0976 " ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA , OCS, STATISTICS, OIL TRANSPORT
1062 " EQUIPMENT, CONTINGENCY PLANNING, SIMULATIONS, SPILL RESPONSE, PERSONNEL TRAINING
1084 " ICE, CONTINGENCY PLANNING, COLD CLIMATES, MODELS, PREDICTIONS, MOVEMENT, USCG
1091 " GUIDELINES, MANUALS, SPILL RESPONSE, PREDICTIONS, MODELS, SPILL TRAJECTORIES, *CLIMATOLOGICAL ATLAS
0900 INTERNATIONAL AGREEMENTS, COASTAL WATERS, POLLUTION PREVENTION, POLLUTION CONTROL, OIL TRANSPORT, *CONFERENCE, *MIDDLE EAST
0901 " EUROPE, BIRDS, SPILL RESPONSE, POLLUTION CONTROL, UK
0983 " ALASKA , OFFSHORE, OIL DISCHARGES, REGULATIONS, OCS
1145 " EXPLORATION, EUROPE, ENVIRONMENTAL EFFECTS, ONSHORE, OFFSHORE, PRODUCTION, OIL TRANSPORT, LEGISLATION, WASTE OIL, *UNEP
0830 INTERNATIONAL CONVENTIONS, CONTAMINATION, SOURCE IDENTIFICATION, PETROLEUM PRODUCTS, POLLUTION CONTROL, USSR
1158 " IMCO, COMPENSATION, OIL TRANSPORT, SHIPS, TANKERS, REGULATIONS, SAFETY, LIABILITY
1198 " EXPLORATION, EUROPE, ANTARCTICA, OFFSHORE, ONSHORE
0829 INTERTIDAL ZONE, COASTS, CALIFORNIA, BEACHES, SOURCE IDENTIFICATION, NATURAL SEEPAGE, TAR, SANTA BARBARA CHANNEL, *ASPHALT DEPOSITS

0923 INTERTIDAL ZONE, DETECTION, BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, INVERTEBRATES, *NEMATODES, *COPEPODS
0931 " FRANCE, ECOSYSTEMS, COASTS, BENTHOS, AMOCO CADIZ SPILL, ONSHORE, SAMPLING
0997 " ENVIRONMENTAL EFFECTS, CHILE, BEACHES, SEDIMENTS, *NORTHERN BREEZE SPILL
1009 " CHEMICAL EFFECTS, BIOLOGICAL EFFECTS, OIL SPILLS, PHYSICAL EFFECTS, *EXPERIMENTAL DESIGN
0765 INVERTEBRATES, FISH, COASTAL WATERS, BENTHOS, SAMPLING, SEDIMENTS, MOLLUSKS, PAH, *MALTA
0918 " TOXICITY, METABOLISM, PAH, *LITTLE SKATE
0923 " INTERTIDAL ZONE, DETECTION, BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, *NEMATODES, *COPEPODS
0926 " COASTAL WATERS, BARENTS SEA, ALGAE, TOXICITY
0928 " AMOCO CADIZ SPILL, MARINE ORGANISMS, *CONVOLUTA ROSCOFFENSIS
1105 " CONCENTRATIONS, AROMATIC HYDROCARBONS, MARINE ORGANISMS, UPTAKE, TOXICITY
1007 IRELAND, ENVIRONMENTAL EFFECTS, SPILL RESPONSE, OFFSHORE
0828 ITALY, COASTS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR, SAMPLING, SEA SURFACE, OIL DISCHARGES, TANKERS, SPAIN, MEDITERRANEAN SEA
0840 IXTOC 1 BLOWOUT, GULF OF MEXICO, EQUIPMENT, SPILL RESPONSE, SPILL CLEANUP, USN, TEXAS, *BURMAH AGATE SPILL
0898 " GULF OF MEXICO, BLOWOUTS, MEXICO
0899 " GULF OF MEXICO, ECONOMICS, OIL SPILLS, POLLUTION CONTROL, SOCIOECONOMIC EFFECTS
1061 " GULF OF MEXICO, FATE, COASTS, BEACHES, SPILL TRAJECTORIES, MODELS
1089 " GULF OF MEXICO, DETECTION, COASTS, NOAA, USCG, *RESEARCH FUNDS
1133 " EPA, ENVIRONMENTAL EFFECTS, SPILL RESPONSE
0874 LAKES , FRESHWATER, CANADA, SPILL CLEANUP, SPILL RESPONSE, ONSHORE, RIVERS
1045 " FATE, CONTAMINATION, MARINE ENVIRONMENT
1023 LAND FARMING, DISPOSAL , BIODEGRADATION, REFINERIES, WASTE OIL, SLUDGE
0896 LEGISLATION, POLLUTION CONTROL, REGULATIONS, *FWPCA
0913 " EXPLORATION, EQUIPMENT, POLLUTION PREVENTION, OIL TRANSPORT, PRODUCTION, REFINING, STORAGE, MANUALS
0942 " COMPENSATION, REGULATIONS, LIABILITY
0992 " EKOFISK BLOWOUT, COLD CLIMATES, BIOLOGICAL EFFECTS, BENTHOS, WILDLIFE, SOCIOECONOMIC EFFECTS, *AIBS, *PROCEEDINGS
1120 " EKOFISK BLOWOUT, NORTH SEA, REGULATIONS, POLLUTION PREVENTION
1124 " MARINE ENVIRONMENT, PRODUCTION, PLATFORMS, NORWAY, UK, NORTH SEA
1129 " CHEMICAL EFFECTS, MICROORGANISMS, OIL INDUSTRY
1145 " INTERNATIONAL AGREEMENTS, EXPLORATION, EUROPE, ENVIRONMENTAL EFFECTS, ONSHORE, OFFSHORE, PRODUCTION, OIL TRANSPORT, WASTE OIL, *UNEP
1167 " SHIPS, TANKERS, REGULATIONS, OIL DISCHARGES
0982 LIABILITY, LEGISLATION, COMPENSATION, REGULATIONS
0984 " SHIPS, POLLUTION CONTROL, WATER QUALITY
1014 " FRANCE, ENVIRONMENTAL EFFECTS, COASTS, CHRONIC EFFECTS, AMOCO CADIZ SPILL, SHORELINES
1158 " INTERNATIONAL CONVENTIONS, IMCO, COMPENSATION, OIL TRANSPORT, SHIPS, TANKERS, REGULATIONS, SAFETY
1125 LOUISIANA, GULF OF MEXICO, ESTUARIES, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DRILLING, OFFSHORE, PRODUCTION
0963 LUBRICATING OIL, CRUDE OIL, CALIFORNIA, NATURAL SEEPAGE, RECYCLING, SANTA BARBARA CHANNEL, *WESSON OIL, *SENSUALITY INDEX
0846 MANUALS, GUIDELINES, EPA, SPILL CLEANUP, SHORELINES, SPILL RESPONSE
0879 " GUIDELINES, FISHERIES, CONTINGENCY PLANNING, COASTAL WATERS, NEW YORK
0886 " GUIDELINES, EPA, COLD CLIMATES, SPILL RESPONSE
0887 " GUIDELINES, EQUIPMENT, BEACHES, SPILL CLEANUP, PERSONNEL TRAINING, SHORELINES
0895 " GUIDELINES, EPA, CONTINGENCY PLANNING, SPILL RESPONSE, SPILL CLEANUP, SHORELINES, RESTORATION
0913 " LEGISLATION, EXPLORATION, EQUIPMENT, POLLUTION PREVENTION, OIL TRANSPORT, PRODUCTION, REFINING, STORAGE
1091 " INFORMATION SYSTEMS, GUIDELINES, SPILL RESPONSE, PREDICTIONS, MODELS, SPILL TRAJECTORIES, *CLIMATOLOGICAL ATLAS
0790 MARINE ENVIRONMENT, DETECTION, CONTAMINATION, REMOTE SENSING
0991 " POLLUTION CONTROL, UK
0993 " DETECTION, CONTAMINATION, MONITORING, POLLUTION CONTROL, OIL TRANSPORT, REFINING, *TURKEY
0996 " FATE, EQUIPMENT, ENVIRONMENTAL EFFECTS, OIL SPILLS, SPILL CLEANUP
0999 " FATE, ENVIRONMENTAL EFFECTS, CANADA, BIBLIOGRAPHIES
1003 " HYDROCARBONS , CONTAMINATION
1005 " HEALTH HAZARDS, ENVIRONMENTAL EFFECTS, CARCINOGENS, SUBLETHAL EFFECTS, MARINE ORGANISMS, UK
1011 " CONTAMINATION, PETROLEUM PRODUCTS
1018 " DEVELOPMENT, OFFSHORE
1032 " CONTAMINATION, BIODEGRADATION, BACTERIA
1039 " BIODEGRADATION, BIBLIOGRAPHIES, MICROORGANISMS
1045 " LAKES , FATE, CONTAMINATION
1074 " ESTUARIES, DISPERSION, CONTAMINATION, MODELS, POLLUTION CONTROL
1097 " SOURCES, OIL TRANSFER, MOVEMENT, POLLUTION CONTROL

1117 MARINE ENVIRONMENT, FATE, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CONTAMINATION, NOAA
1124 " LEGISLATION, PRODUCTION, PLATFORMS, NORWAY, UK, NORTH SEA
1104 MARINE MAMMALS, CRUDE OIL, METABOLISM, *SEA OTTERS
0769 MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, BEACHES, MONITORING, SUBLETHAL EFFECTS, TOXICITY, UNEP, MEDITERRANEAN SEA, *MALTA
0770 " HYDROCARBONS , GULF OF MEXICO, CONCENTRATIONS, CARIBBEAN SEA, WSF, SEAWATER
0807 " INDIA, HARBORS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, *MADRAS
0815 " DRILLING, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, PLATFORMS, SAMPLING, SEDIMENTS
0818 " DISTRIBUTION, CONCENTRATIONS, CHEMICAL ANALYSIS, MOLLUSKS, SEDIMENTS, *SULFUR COMPOUNDS
0832 " CHROMATOGRAPHY, SOURCE IDENTIFICATION, OIL SLICKS, MONITORING, SEDIMENTS
0922 " CONTAMINAIION, BIOINDICATORS, NORTH SEA
0925 " CHRONIC EFFECTS, ACUTE EFFECTS
0928 " INVERTEBRATES, AMOCO CADIZ SPILL, *CONVOLUTA ROSCOFFENSIS
0936 " BIOLOGICAL EFFECTS, PETROLEUM PRODUCTS, MICROORGANISMS
0942 " BIOLOGICAL EFFECTS, AROMATIC HYDROCARBONS, *NAPHTHALENES
0949 " FISH, TOXICITY, *DIATOMS, *GELLING COMPOUNDS
0951 " BENTHOS, PETROLEUM PRODUCTS, SURFACTANTS, MOLLUSKS
0987 " ENVIRONMENTAL EFFECTS, US, *RESEARCH PROGRAMS
1005 " MARINE ENVIRONMENT, HEALTH HAZARDS, ENVIRONMENTAL EFFECTS, CARCINOGENS, SUBLETHAL EFFECTS, UN
1031 " CRUDE OIL, BIODEGRADATION, SEAWATER, MICROORGANISMS, MOLLUSKS, *NEMATODES, *POLYCHAETES, *SUBSTRATES
1105 " INVERTEBRATES, CONCENTRATIONS, AROMATIC HYDROCARBONS, UPTAKE, TOXICITY
1112 " DEPURATION, CHRONIC EFFECTS, ALASKA , ACUTE EFFECTS, TOXICITY, UPTAKE, SUBLETHAL EFFECTS, *OCSEAP PROGRAM
1126 " HYDROCARBONS , ENVIRONMENTAL EFFECTS, BLM, OFFSHORE, PRODUCTION, SEDIMENTS
1127 " DISTRIBUTION, CALIFORNIA, PLATFORMS, OFFSHORE
0805 MASSACHUSETTS, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, ATLANTIC COAST, SOURCES, SEDIMENTS, OCS
1016 " ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CRUSTACEANS, CONTAMINATION, SEDIMENTS, NARRAGANSETT BAY
0763 MEDITERRANEAN SEA, CONCENTRATIONS, BLACK SEA, BIODEGRADATION, MONITORING, SAMPLING, MICROORGANISMS, MOLLUSKS, USSR
0769 " MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, BEACHES, MONITORING, SUBLETHAL EFFECTS, TOXICITY, UNEP, *MALTA
0773 " HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, MONITORING, TAR
0778 " COASTS, COASTAL WATERS, REMOTE SENSING, MONITORING, SURVEILLANCE, POLLUTION CONTROL, TANKERS, *TURKEY
0803 " DRILLING, DISTRIBUTION, COASTAL WATERS, BEACHES, SAMPLING, TAR, ZOOPLANKTON, *NEUSTON
0804 " HYDROCARBONS , CONTAMINATION, CONCENTRATIONS, WSF, SEA SURFACE, SAMPLING
0821 " CONTAMINATION, CONCENTRATIONS, TAR, SEA SURFACE, SAMPLING
0828 " ITALY, COASTS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR, SAMPLING, SEA SURFACE, OIL DISCHARGES, TANKERS, SPAIN
0892 " CONTINGENCY PLANNING, POLLUTION CONTROL
0959 " DISTRIBUTION, CONTAMINATION, ADSORPTION, PHYSICAL ASPECTS, OIL SLICKS, TAR, SEDIMENTS, SEA SURFACE
1001 " HYDROCARBONS , CONTAMINATION
1013 " FISHERIES, CONTAMINATION, MORTALITY, SUBLETHAL EFFECTS, UN, *FAO
1022 " DISTRIBUTION, CONCENTRATIONS, BIODEGRADATION, BACTERIA, SEAWATER, SEDIMENTS, *DETERGENTS
1096 " CONTAMINATION, COASTAL WATERS, BALLAST , SOURCES
0918 METABOLISM, INVERTEBRATES, TOXICITY, PAH, *LITTLE SKATE
0939 " CRUDE OIL, BIRDS, WEATHERING, *TESTOSTERONE, *GULLS
1006 " CONTAMINATION, CHEMICAL ANALISIS, CARCINOGENS, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH, MUTAGENS
1020 " ENVIRONMENTAL EFFECTS, BIODEGRADATION, UPTAKE, MICROORGANISMS, MAMMALS
1036 " HYDROCARBONS , BIODEGRADATION, MICROORGANISMS, *ALICYCLIC HYDROCARBONS
1040 " HYDROCARBONS , CRUDE OIL, BIODEGRADATION, AROMATIC HYDROCARBONS, MICROORGANISMS, PETROLEUM PRODUCTS
1100 " HYDROCARBONS , FISH, PAH, UPTAKE, *SALMON
1101 " FISH, CRUDE OIL, CHRONIC EFFECTS, WSF, SUBLETHAL EFFECTS, *MORPHOLOGICAL CHANGES
1104 " MARINE MAMMALS, CRUDE OIL, *SEA OTTERS
1106 " FISH, BEHAVIOR, UPTAKE, SUBLETHAL EFFECTS, *BIOTRANSFORMATION, *TRACE METAL EFFECTS
1113 " HYDROCARBONS , FISH, FATE, ARCTIC, *TRACE METAL EFFECTS
1115 " FOOD WEB, FATE, CRUDE OIL, BIOLOGICAL EFFECTS, UPTAKE, MOVEMENT, WSF
0888 METULA SPILL, CONTINGENCY PLANNING, POLLUTION CONTROL, SPILL RESPONSE, *JACOB MAERSK SPILL
0898 MEXICO , IXTOC 1 BLOWOUT, GULF OF MEXICO, BLOWOUTS
0763 MICROORGANISMS, MEDITERRANEAN SEA, CONCENTRATIONS, BLACK SEA, BIODEGRADATION, MONITORING, SAMPLING, MOLLUSKS, USSR
0936 " MARINE ORGANISMS, BIOLOGICAL EFFECTS, PETROLEUM PRODUCTS
0944 " HEALTH HAZARDS, CARCINOGENS, BOOK REVIEW, PAH, MAMMALS

0968 MICROORGANISMS, HYDROCARBONS , BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES, OCS
0969 " BIODEGRADATION, BASELINE STUDIES, ALASKA , OCS
0970 " FOOD WEB, ECOSYSTEMS, DEVELOPMENT, CHEMICAL EFFECTS, BASELINE STUDIES, ALASKA , OCS
0977 " GULF OF ALASKA, BIODEGRADATION, BASELINE STUDIES, SEDIMENTS
1019 " DISTRIBUTION, BIODEGRADATION, ALASKA , OCS, *COOK INLET
1020 " METABOLISM, ENVIRONMENTAL EFFECTS, BIODEGRADATION, UPTAKE, MAMMALS
1024 " CRUDE OIL, CONNECTICUT, BIODEGRADATION, BEACHES, SPILL CLEANUP, SEDIMENTS,
SHORELINES
1025 " DETECTION, COASTS, BIODEGRADATION, BENTHOS, ANNELIDS, SEDIMENTS, PAH
1026 " INDUSTRIES, BIODEGRADATION, PETROLEUM PRODUCTS
1028 " BIODEGRADATION, AROMATIC HYDROCARBONS
1030 " HYDROCARBONS , GROWTH, BIODEGRADATION, SURFACTANTS
1031 " MARINE ORGANISMS, CRUDE OIL, BIODEGRADATION, SEAWATER, MOLLUSKS, *NEMATODES,
*POLYCHAETES, *SUBSTRATES
1036 " METABOLISM, HYDROCARBONS , BIODEGRADATION, *ALICYCLIC HYDROCARBONS
1037 " BIODEGRADATION, WEATHERING, OXIDATION, USSR
1038 " MARINE ENVIRONMENT, BIODEGRADATION, BIBLIOGRAPHIES
1040 " METABOLISM, HYDROCARBONS , CRUDE OIL, BIODEGRADATION, AROMATIC HYDROCARBONS,
PETROLEUM PRODUCTS
1041 " HYDROCARBONS , BIODEGRADATION, *GENETICS
1108 " CRUDE OIL, COLD CLIMATES, BIODEGRADATION, UPTAKE, SEAWATER, SEDIMENTS
1129 " LEGISLATION, CHEMICAL EFFECTS, OIL INDUSTRY
1046 MODELS, ICE, COLD CLIMATES, BEHAVIOR, ARCTIC, PHYSICAL ASPECTS, OIL SLICKS,
PREDICTIONS, SPILL TRAJECTORIES, *WORKSHOP PROCEEDINGS
1059 " EVAPORATION, BEHAVIOR, SIMULATIONS, OIL INDUSTRY, OIL SLICKS, MOVEMENT, SPREADING
1061 " IXTOC 1 BLOWOUT, GULF OF MEXICO, FATE, COASTS, BEACHES, SPILL TRAJECTORIES
1066 " ESTUARIES, COASTAL WATERS, BEHAVIOR, PREDICTIONS, OIL SLICKS, *CIRCULATION MODELING
1068 " GEORGES BANK, FISHERIES, ENVIRONMENTAL EFFECTS, BEHAVIOR, SIMULATIONS
1070 " GULF OF ALASKA, COASTS, COASTAL WATERS, STATISTICAL ANALYSIS, SPILL TRAJECTORIES
1072 " DISTRIBUTION, PREDICTIONS, OIL SLICKS, *THICKNESS
1074 " MARINE ENVIRONMENT, ESTUARIES, DISPERSION, CONTAMINATION, POLLUTION CONTROL
1075 " BEHAVIOR, PREDICTIONS, SEA SURFACE, OIL SLICKS, MOVEMENT
1076 " BEHAVIOR, MOVEMENT, SPREADING, SEA SURFACE, OIL SLICKS, *HYDRODYNAMIC EQUATIONS
1077 " EMULSIONS, PREDICTIONS, DISPERSIONS, OIL SLICKS, SEA SURFACE, *WATER COLUMN
1078 " PREDICTIONS, SPILL TRAJECTORIES, SPILL RESPONSE, *OPERATIONAL FORECAST MODEL
1079 " DISPERSION, PHYSICAL ASPECTS, OIL SPILLS, SEA SURFACE, *BREAKING WAVES
1082 " EMULSIFICATION, DISPERSION, BEHAVIOR, OIL SLICKS, USN, USCG, *WAVTOP PROGRAM
1083 " FATE, BEHAVIOR, SIMULATIONS, PHYSICAL EFFECTS, OIL SPILLS
1084 " INFORMATION SYSTEMS, ICE, CONTINGENCY PLANNING, COLD CLIMATES, PREDICTIONS,
MOVEMENT, USCG
1086 " ENVIRONMENTAL EFFECTS, COASTS, BEHAVIOR, PREDICTIONS, SIMULATIONS, SPILL
TRAJECTORIES, NOAA
1088 " ARGO MERCHANT SPILL, SIMULATIONS, MOVEMENT, SPREADING, OIL SLICKS, SEA SURFACE,
*SURFACE CURRENTS
1091 " MANUALS, INFORMATION SYSTEMS, GUIDELINES, SPILL RESPONSE, PREDICTIONS, SPILL
TRAJECTORIES, *CLIMATOLOGICAL ATLAS
1143 " EXPLORATION, CALIFORNIA, OIL-GAS LEASING, RISK ANALYSIS, OFFSHORE, OIL TRANSPORT,
SPILL TRAJECTORIES
1200 " BEHAVIOR, PHYSICAL ASPECTS, SIMULATIONS, *MATHEMATICAL ANALYSIS
0763 MOLLUSKS, MICROORGANISMS, MEDITERRANEAN SEA, CONCENTRATIONS, BLACK SEA,
BIODEGRADATION, MONITORING, SAMPLING, USSR
0765 " INVERTEBRATES, FISH, COASTAL WATERS, BENTHOS, SAMPLING, SEDIMENTS, PAH, *MALTA
0809 " CHROMATOGRAPHY, CHEMICAL ANALYSIS, PAH, *OYSTERS
0818 " MARINE ORGANISMS, DISTRIBUTION, CONCENTRATIONS, CHEMICAL ANALYSIS, SEDIMENTS,
*SULFUR COMPOUNDS
0924 " CHRONIC EFFECTS, BIOLOGICAL EFFECTS, REPRODUCTION, MORTALITY, SUBLETHAL EFFECTS
0933 " GROWTH, DEVELOPMENT, BIOLOGICAL EFFECTS, AMOCO CADIZ SPILL, *DENTALIUM EGGS
0941 " ESTUARIES, CRUDE OIL, CHRONIC EFFECTS, *OYSTERS
0951 " MARINE ORGANISMS, BENTHOS, PETROLEUM PRODUCTS, SURFACTANTS
0974 " DISTRIBUTION, BASELINE STUDIES, MONITORING, *RAZOR CLAMS
1031 " MICROORGANISMS, MARINE ORGANISMS, CRUDE OIL, BIODEGRADATION, SEAWATER, *NEMATODES,
*POLYCHAETES, *SUBSTRATES
1186 " FISH, BIOASSAY, OIL-WATER SEPARATION, REGULATIONS, WASTEWATERS, OIL DISCHARGES
0751 MONITORING, EQUIPMENT, BALLAST , SPILL CLEANUP, SPILL REMOVAL, PRODUCT INFORMATION
0752 " EQUIPMENT, DETECTION, OIL SLICKS, SPILL RESPONSE, PRODUCT INFORMATION, *OIL
THICKNESS SENSOR
0753 " HYDROCARBONS , DISTRIBUTION, CONTAMINATION, COASTS, CHEMICAL ANALYSIS, BAYS, WSF,
SAMPLING, *ADRIATIC SEA
0754 " ANALYTICAL TECHNIQUES, ABSORPTION, PAH
0755 " DETECTION, SURVEILLANCE, OIL SPILLS
0757 " EQUIPMENT, DRIFT, MOVEMENT, OIL SLICKS, REMOTE SENSING, PRODUCT INFORMATION
0761 " DETECTION, BIBLIOGRAPHIES, REMOTE SENSING, SURVEILLANCE
0763 " MOLLUSKS, MICROORGANISMS, MEDITERRANEAN SEA, CONCENTRATIONS, BLACK SEA,
BIODEGRADATION, SAMPLING, USSR
0764 " EQUIPMENT, CONTAMINATION, CONCENTRATIONS

0767 MONITORING, EQUIPMENT, WASTEWATERS, SHIPS, TANKERS, PERFORMANCE TESTING, UK
0769 " MEDITERRANEAN SEA, MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, BEACHES, SUBLETHAL EFFECTS, TOXICITY, UNEP, *MALTA
0773 " MEDITERRANEAN SEA, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, TAR
0778 " MEDITERRANEAN SEA, COASTS, COASTAL WATERS, REMOTE SENSING, SURVEILLANCE, POLLUTION CONTROL, TANKERS, *TURKEY
0781 " REMOTE SENSING, POLLUTION PREVENTION, SOURCE IDENTIFICATION, SURVEILLANCE, POLLUTION CONTROL
0782 " DETECTION, CALIFORNIA, REMOTE SENSING, NATURAL SEEPAGE, TAR, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY, *OCEANOGRAPHY
0783 " GULF OF MEXICO, REMOTE SENSING, IXTOC 1 SPILL, SURVEILLANCE, *LANDSAT
0787 " ALABAMA, REMOTE SENSING, OIL FIELDS, WATER QUALITY
0791 " ICE, DETECTION, CONTAMINATION, REMOTE SENSING, *MICROWAVES
0796 " ICE, EQUIPMENT, DETECTION, REMOTE SENSING, OIL SLICKS
0832 " MARINE ORGANISMS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, OIL SLICKS, SEDIMENTS
0883 " INCINERATION, ICE, CANADA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, SPILL CLEANUP, *AMOP PROGRAM
0890 " ICE, EQUIPMENT, CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, SPILL REMOVAL
0902 " COASTS, POLLUTION PREVENTION, SPILL RESPONSE, POLLUTION CONTROL, *ARABIAN GULF
0972 " FATE, DRIFT, BERING SEA, BASELINE STUDIES, PREDICTIONS, SPILL TRAJECTORIES, SEA SURFACE, OCS
0974 " MOLLUSKS, DISTRIBUTION, BASELINE STUDIES, *RAZOR CLAMS
0993 " MARINE ENVIRONMENT, DETECTION, CONTAMINATION, POLLUTION CONTROL, OIL TRANSPORT, REFINING, *TURKEY
1012 " FISHERIES, EUROPE, ATLANTIC OCEAN, REGULATIONS
1128 " ENVIRONMENTAL EFFECTS, OFFSHORE, PLATFORMS, SAFETY, *UNDERWATER INSPECTION
1146 " ENVIRONMENTAL EFFECTS, DEVELOPMENT, CONTINGENCY PLANNING, OFFSHORE, PRODUCTION, PLATFORMS, OIL TERMINALS
1147 " GOVERNMENT AGENCIES, BIRDS, ALASKA , SHIPS, SPILL CLEANUP, *USFWS
1166 " EQUIPMENT, DETECTION, OIL SPILLS, TANKERS, OIL TRANSFER, PRODUCT INFORMATION
1188 " EQUIPMENT, COST ANALYSIS, OIL-WATER SEPARATION, PERFORMANCE TESTING, PRODUCT INFORMATION
0917 MORTALITY, CANADA, BIOLOGICAL EFFECTS, ARCTIC, MAMMALS, *POLAR BEARS
0919 " FUEL OIL, CONCENTRATIONS, ALGAE, PETROLEUM PRODUCTS, TOXICITY, *SYNECHOCYSTIS AQUATILIS
0924 " MOLLUSKS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, REPRODUCTION, SUBLETHAL EFFECTS
0932 " FUEL OIL, BIRDS, BIOLOGICAL EFFECTS, *INCUBATING GULLS
0934 " FUEL OIL, EMULSIONS, CONCENTRATIONS, TOXICITY, ZOOPLANKTON, *DIESEL OIL, *EURYDICE TRUNCATA
0938 " FUEL OIL, CHRONIC EFFECTS, SUBLETHAL EFFECTS, WSF
0943 " BIRDS, AMOCO CADIZ SPILL
0966 " BIRDS, RESTORATION, UK
1013 " MEDITERRANEAN SEA, FISHERIES, CONTAMINATION, SUBLETHAL EFFECTS, UN, *FAO
1110 " GULF OF ALASKA, CRUDE OIL, BIRDS, SUBLETHAL EFFECTS, *HERRING GULLS
1114 " HEALTH HAZARDS, OIL INDUSTRY, REFINERIES, STATISTICAL ANALYSIS, *REFINERY WORKERS
0757 MOVEMENT, MONITORING, EQUIPMENT, DRIFT, OIL SLICKS, REMOTE SENSING, PRODUCT INFORMATION
0786 " FATE, DISTRIBUTION, CALIFORNIA, BEHAVIOR, REMOTE SENSING, NATURAL SEEPAGE, SANTA BARBARA CHANNEL, OIL SLICKS, *METEOROLOGY, *OCEANOGRAPHY
0806 " GULF OF ALASKA, FATE, DISTRIBUTION, BERING SEA, BASELINE STUDIES, *SUSPENDED PARTICULATES
0910 " FATE, DRIFT, BIODEGRADATION, SPILL RESPONSE, SPILL CLEANUP, WEATHERING
0952 " ICE, DRIFT, COASTS, ARCTIC, ALASKA , SEA SURFACE, SPILL TRAJECTORIES, *CURRENTS, *METEOROLOGY
0980 " ICE, DRIFT, BEAUFORT SEA, BASELINE STUDIES, SPILL TRAJECTORIES, *CHUKCHI SEA
1047 " FATE, CALIFORNIA, BEHAVIOR, NATURAL SEEPAGE, SOURCES, SEA SURFACE, PHYSICAL ASPECTS, SANTA BARBARA CHANNEL, *OCEANOGRAPHY
1048 " ICE, COLD CLIMATES, CANADA, BEHAVIOR, PHYSICAL ASPECTS, *RESEARCH REVIEW
1052 " ICE, FATE, BEHAVIOR, ALASKA , PRUDHOE BAY
1058 " DEVELOPMENT, BEAUFORT SEA, PREDICTIONS, OIL SPILLS, OFFSHORE, *STORM SURGES
1059 " MODELS, EVAPORATION, BEHAVIOR, SIMULATIONS, OIL INDUSTRY, OIL SLICKS, SPREADING
1060 " BLOWOUTS, SIMULATIONS, OIL SLICKS, SPREADING, NORTH SEA, *SLIKTRACK
1065 " ESTUARIES, SIMULATIONS, OIL SLICKS, ST. LAWRENCE RIVER, SPILL TRAJECTORIES
1071 " INDIA, DRIFT, COASTS, SPILL TRAJECTORIES, OIL SLICKS
1073 " DISTRIBUTION, BEHAVIOR, PREDICTIONS, SEA SURFACE
1075 " MODELS, BEHAVIOR, PREDICTIONS, SEA SURFACE, OIL SLICKS
1076 " MODELS, BEHAVIOR, SPREADING, SEA SURFACE, OIL SLICKS, *HYDRODYNAMIC EQUATIONS
1080 " ICE, DISTRIBUTION, OIL SPILLS, PREDICTIONS, *ICE COMPACTNESS
1084 " MODELS, INFORMATION SYSTEMS, ICE, CONTINGENCY PLANNING, COLD CLIMATES, PREDICTIONS, USCG
1085 " ICE, BEHAVIOR, BEAUFORT SEA, PREDICTIONS, SPILL TRAJECTORIES, *CHUKCHI SEA
1088 " MODELS, ARGO MERCHANT SPILL, SIMULATIONS, SPREADING, OIL SLICKS, SEA SURFACE, *SURFACE CURRENTS
1097 " MARINE ENVIRONMENT, SOURCES, OIL TRANSFER, POLLUTION CONTROL
1115 " METABOLISM, FOOD WEB, FATE, CRUDE OIL, BIOLOGICAL EFFECTS, UPTAKE, WSF

0950 MUTAGENS, HYDROCARBONS , BIOLOGICAL EFFECTS, TOXICITY, WEATHERING
1006 " METABOLISM, CONTAMINATION, CHEMICAL ANALYSIS, CARCINOGENS, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES, PAH
1016 NARRAGANSETT BAY, MASSACHUSETTS, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CRUSTACEANS, CONTAMINATION, SEDIMENTS
0758 NATURAL SEEPAGE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, SOURCES, *SANTA MONICA BAY, *GEOPHYSICS
0759 " COASTAL WATERS, CALIFORNIA, TAR, OCS, STATISTICS, *SEISMICITY
0782 " MONITORING, DETECTION, CALIFORNIA, REMOTE SENSING, TAR, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY, *OCEANOGRAPHY
0785 " DETECTION, REMOTE SENSING, OIL SLICKS, SANTA BARBARA CHANNEL, *OCEAN COLOR SCANNER
0786 " MOVEMENT, FATE, DISTRIBUTION, CALIFORNIA, BEHAVIOR, REMOTE SENSING, SANTA BARBARA CHANNEL, OIL SLICKS, *METEOROLOGY, *OCEANOGRAPHY
0797 " DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, SEAWATER, WEATHERING, NOAA
0810 " CRUDE OIL, COASTAL WATERS, CHEMICAL ANALYSIS, CALIFORNIA, BEACHES, ANALYTICAL TECHNIQUES, TAR
0826 " EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, PRODUCTION, OFFSHORE, SAMPLING, TAR, SOURCES, SANTA BARBARA CHANNEL
0827 " DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, OIL SPILLS, SWEDEN, OFFSHORE, ONSHORE, REFINERIES, OIL TRANSFER, TANKERS, SHIPS
0829 " INTERTIDAL ZONE, COASTS, CALIFORNIA, BEACHES, SOURCE IDENTIFICATION, TAR, SANTA BARBARA CHANNEL, *ASPHALT DEPOSITS
0963 " LUBRICATING OIL, CRUDE OIL, CALIFORNIA, RECYCLING, SANTA BARBARA CHANNEL, *WESSON OIL, *SENSUALITY INDEX
1047 " MOVEMENT, FATE, CALIFORNIA, BEHAVIOR, SOURCES, SEA SURFACE, PHYSICAL ASPECTS, SANTA BARBARA CHANNEL, *OCEANOGRAPHY
1093 " HYDROCARBONS , FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, SOURCES, TAR, SANTA BARBARA CHANNEL
1094 " FATE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, TAR, SOURCES, OFFSHORE, SANTA BARBARA CHANNEL
1095 " FATE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, OCS, SOURCES, SANTA BARBARA CHANNEL, *GEOLOGY
1118 " HYDROCARBONS , EXPLORATION, CHEMICAL EFFECTS, CALIFORNIA, PRODUCTION, OCS, SOURCES
0879 NEW YORK, MANUALS, GUIDELINES, FISHERIES, CONTINGENCY PLANNING, COASTAL WATERS
0885 " HARBORS, CONTINGENCY PLANNING, SPILL RESPONSE, POLLUTION CONTROL, SPILL COOPERATIVES, PORTS
0797 NOAA, NATURAL SEEPAGE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, SAMPLING, SEAWATER, WEATHERING
0957 " ICE, BLM, ARCTIC, SEA SURFACE, *OIL ENTRAINMENT, *SEASONAL VARIATIONS, *NORCOP/OCS
1004 " ENVIRONMENTAL EFFECTS, USGS, *USNS POTOMAC SPILL, *RESEARCH RESULTS, *GREENLAND FISHERIES INVESTIGATIONS
1015 " ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES, ARCTIC, SUBARCTIC REGIONS
1086 " MODELS, ENVIRONMENTAL EFFECTS, COASTS, BEHAVIOR, PREDICTIONS, SIMULATIONS, SPILL TRAJECTORIES
1089 " IXTOC 1 BLOWOUT, GULF OF MEXICO, DETECTION, COASTS, USCG, *RESEARCH FUNDS
1116 " DEVELOPMENT, BLM, ALASKA , RISK ANALYSIS, OCS
1117 " MARINE ENVIRONMENT, FATE, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CONTAMINATION
0776 NORTH SEA, EQUIPMENT, DESIGN-ENGINEERING, COASTS, REMOTE SENSING, SURVEILLANCE, NORWAY, PRODUCT INFORMATION
0819 " BALTIC SEA, SAMPLING, PETROLEUM PRODUCTS, SEAWATER
0922 " MARINE ORGANISMS, CONTAMINATION, BIOINDICATORS
0937 " CONTAMINATION, BIOLOGICAL EFFECTS, PLANKTON
0981 " EQUIPMENT, CHRONIC EFFECTS, OIL DISCHARGES, SOCIOECONOMIC EFFECTS, NORWAY, UK, REGULATIONS
1060 " MOVEMENT, BLOWOUTS, SIMULATIONS, OIL SLICKS, SPREADING, *SLIKTRACK
1120 " LEGISLATION, EKOFISK BLOWOUT, REGULATIONS, POLLUTION PREVENTION
1124 " MARINE ENVIRONMENT, LEGISLATION, PRODUCTION, PLATFORMS, NORWAY, UK
1131 " GOVERNMENT AGENCIES, EKOFISK BLOWOUT, CONTINGENCY PLANNING, POLLUTION CONTROL, SAFETY, OIL INDUSTRY
1160 " CONTAMINATION, PIPELINES, OIL SPILLS, US
0776 NORWAY, NORTH SEA, EQUIPMENT, DESIGN-ENGINEERING, COASTS, REMOTE SENSING, SURVEILLANCE, PRODUCT INFORMATION
0881 " CONTINGENCY PLANNING, SPILL RESPONSE, POLLUTION PREVENTION
0981 " NORTH SEA, EQUIPMENT, CHRONIC EFFECTS, OIL DISCHARGES, SOCIOECONOMIC EFFECTS, UK, REGULATIONS
1124 " NORTH SEA, MARINE ENVIRONMENT, LEGISLATION, PRODUCTION, PLATFORMS, UK
1194 " FISHERIES, COMPENSATION, OIL INDUSTRY, OFFSHORE
0759 OCS, NATURAL SEEPAGE, COASTAL WATERS, CALIFORNIA, TAR, STATISTICS, *SEISMICITY
0805 " MASSACHUSETTS, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, ATLANTIC COAST, SOURCES, SEDIMENTS
0814 " HYDROCARBONS , DRILLING, DISTRIBUTION, CONCENTRATIONS, SAMPLING, PLATFORMS, SEDIMENTS, TEXAS
0968 " MICROORGANISMS, HYDROCARBONS , BIODEGRADATION, BEAUFORT SEA, BASELINE STUDIES
0969 " MICROORGANISMS, BIODEGRADATION, BASELINE STUDIES, ALASKA

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0970  OCS, MICROORGANISMS, FOOD WEB, ECOSYSTEMS, DEVELOPMENT, CHEMICAL EFFECTS, BASELINE
           STUDIES, ALASKA
0972    "  MONITORING, FATE, DRIFT, BERING SEA, BASELINE STUDIES, PREDICTIONS, SPILL
           TRAJECTORIES, SEA SURFACE
0975    "  INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA
           , STATISTICS, OIL TRANSPORT
0976    "  INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA
           , STATISTICS, OIL TRANSPORT
0979    "  GOVERNMENT AGENCIES, EXPLORATION, DEVELOPMENT, BASELINE STUDIES, OIL-GAS LEASING,
           US, *DEPARTMENT OF THE INTERIOR
0983    "  INTERNATIONAL AGREEMENTS, ALASKA , OFFSHORE, OIL DISCHARGES, REGULATIONS
1019    "  MICROORGANISMS, DISTRIBUTION, BIODEGRADATION, ALASKA , *COOK INLET
1063    "  DRIFT, SIMULATIONS, OIL SPILLS, OIL INDUSTRY, PHYSICAL ASPECTS, SEA SURFACE
1064    "  GULF OF ALASKA, PREDICTIONS, RISK ANALYSIS, OIL-GAS LEASING, *KODIAK ISLAND LEASE
           AREA
1087    "  GULF OF ALASKA, RISK ANALYSIS, PREDICTIONS, OIL-GAS LEASING, *KODIAK ISLAND LEASE
           AREA
1095    "  NATURAL SEEPAGE, FATE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, SOURCES,
           SANTA BARBARA CHANNEL, *GEOLOGY
1102    "  FISH, DEVELOPMENT, BEHAVIOR, SUBLETHAL EFFECTS, PACIFIC OCEAN
1103    "  GULF OF MEXICO, BACTERIA, OIL FIELDS, PLATFORMS, TOXICITY, SAMPLING
1107    "  FISH, CRUDE OIL, CONTAMINATION, COASTAL WATERS, CHRONIC EFFECTS, BERING SEA,
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1116    "  NOAA, DEVELOPMENT, BLM, ALASKA , RISK ANALYSIS
1118    "  NATURAL SEEPAGE, HYDROCARBONS , EXPLORATION, CHEMICAL EFFECTS, CALIFORNIA,
           PRODUCTION, SOURCES
1144    "  DRILLING, DEVELOPMENT, BLOWOUTS, USGS, STATISTICS, PLATFORMS, OFFSHORE
0824  OFFSHORE, HYDROCARBONS , HARBORS, COASTS, CHEMICAL ANALYSIS, BERMUDA, SEDIMENTS
0826    "  NATURAL SEEPAGE, EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, PRODUCTION,
           SAMPLING, TAR, SOURCES, SANTA BARBARA CHANNEL
0827    "  NATURAL SEEPAGE, DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, OIL SPILLS,
           SWEDEN, ONSHORE, REFINERIES, OIL TRANSFER, TANKERS, SHIPS
0978    "  EXPLORATION, ENVIRONMENTAL EFFECTS, CANADA, BLOWOUTS, BASELINE STUDIES
0983    "  OCS, INTERNATIONAL AGREEMENTS, ALASKA , OIL DISCHARGES, REGULATIONS
1007    "  IRELAND, ENVIRONMENTAL EFFECTS, SPILL RESPONSE
1018    "  MARINE ENVIRONMENT, DEVELOPMENT
1058    "  MOVEMENT, DEVELOPMENT, BEAUFORT SEA, PREDICTIONS, OIL SPILLS, *STORM SURGES
1094    "  NATURAL SEEPAGE, FATE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA,
           BIOLOGICAL EFFECTS, TAR, SOURCES, SANTA BARBARA CHANNEL
1122    "  FISHERIES, REGULATIONS, UK, OIL INDUSTRY
1123    "  EXPLORATION, CANADA, ARCTIC, REGULATIONS
1125    "  LOUISIANA, GULF OF MEXICO, ESTUARIES, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, DRILLING,
           PRODUCTION
1126    "  MARINE ORGANISMS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BLM, PRODUCTION, SEDIMENTS
1127    "  MARINE ORGANISMS, DISTRIBUTION, CALIFORNIA, PLATFORMS
1128    "  MONITORING, ENVIRONMENTAL EFFECTS, PLATFORMS, SAFETY, *UNDERWATER INSPECTION
1130    "  ICE, EXPLORATION, BLOWOUT PREVENTION, ARCTIC, PLATFORMS, *ARTIFICIAL ICE PLATFORMS
1132    "  GEORGES BANK, FISHERIES, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC OCEAN, OIL INDUSTRY,
           PRODUCTION
1135    "  EUROPE, ENVIRONMENTAL EFFECTS, PRODUCTION, RESOURCE MANAGEMENT, *EEC
1137    "  ENVIRONMENTAL EFFECTS, CONTAMINATION, OIL INDUSTRY, SOCIOECONOMIC EFFECTS,
           ONSHORE, VENEZUELA
1138    "  GULF OF MEXICO, ENVIRONMENTAL EFFECTS, BERMUDA, PRODUCTION, PLATFORMS, REFINERIES,
           SANTA BARBARA CHANNEL, VENEZUELA
1140    "  GULF OF MEXICO, ENVIRONMENTAL EFFECTS, CONCENTRATIONS, PRODUCTION
1142    "  ECONOMICS, DEVELOPMENT, SOCIOECONOMIC EFFECTS, ONSHORE, RESOURCE MANAGEMENT, OIL
           INDUSTRY
1143    "  MODELS, EXPLORATION, CALIFORNIA, OIL-GAS LEASING, RISK ANALYSIS, OIL TRANSPORT,
           SPILL TRAJECTORIES
1144    "  OCS, DRILLING, DEVELOPMENT, BLOWOUTS, USGS, STATISTICS, PLATFORMS
1145    "  LEGISLATION, INTERNATIONAL AGREEMENTS, EXPLORATION, EUROPE, ENVIRONMENTAL EFFECTS,
           ONSHORE, PRODUCTION, OIL TRANSPORT, WASTE OIL, *UNEP
1146    "  MONITORING, ENVIRONMENTAL EFFECTS, DEVELOPMENT, CONTINGENCY PLANNING, PRODUCTION,
           PLATFORMS, OIL TERMINALS
1194    "  NORWAY, FISHERIES, COMPENSATION, OIL INDUSTRY
1197    "  DRILLING, CALIFORNIA, SEDIMENTS, *BARIUM
1198    "  INTERNATIONAL CONVENTIONS, EXPLORATION, EUROPE, ANTARCTICA, ONSHORE
1199    "  DEVELOPMENT, ONSHORE, OIL INDUSTRY, SCOTLAND, *OIL RELATED UNIVERSITY RESEARCH
0775  OIL DISCHARGES, HYDROCARBONS , REMOTE SENSING, OIL SLICKS, SHIPS, TANKERS,NATURAL
           SEEPAGE
0828    "  MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR,
           SAMPLING, SEA SURFACE, TANKERS, SPAIN
0981    "  NORWAY, NORTH SEA, EQUIPMENT, CHRONIC EFFECTS, SOCIOECONOMIC EFFECTS, UK,
           REGULATIONS
0983    "  OFFSHORE, OCS, INTERNATIONAL AGREEMENTS, ALASKA , REGULATIONS
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1155 OIL DISCHARGES, IMCO, BALLAST , TANKERS, REGULATIONS, POLLUTION CONTROL
1167 " LEGISLATION, SHIPS, TANKERS, REGULATIONS
1196 " MOLLUSKS, FISH, BIOASSAY, OIL-WATER SEPARATION, REGULATIONS, WASTEWATERS
0787 OIL FIELDS, MONITORING, ALABAMA, REMOTE SENSING, WATER QUALITY
1103 " OCS, GULF OF MEXICO, BACTERIA, PLATFORMS, TOXICITY, SAMPLING
1171 " COASTAL WATERS, CALIFORNIA, REFINERIES, WASTEWATER TREATMENT, OXIDATION
0979 OIL-GAS LEASING, OCS, GOVERNMENT AGENCIES, EXPLORATION, DEVELOPMENT, BASELINE STUDIES, US, *DEPARTMENT OF THE INTERIOR
1064 " OCS, GULF OF ALASKA, PREDICTIONS, RISK ANALYSIS, *KODIAK ISLAND LEASE AREA
1087 " OCS, GULF OF ALASKA, RISK ANALYSIS, PREDICTIONS, *KODIAK ISLAND LEASE AREA
1143 " OFFSHORE, MODELS, EXPLORATION, CALIFORNIA, RISK ANALYSIS, OIL TRANSPORT, SPILL TRAJECTORIES
0912 OIL INDUSTRY, DRILLING, BLOWOUT PREVENTION, POLLUTION CONTROL, PLATFORMS, PERSONNEL TRAINING, SAFETY, *UNEP
0995 " BOOK REVIEW, BIRDS, SPILL RESPONSE, *BIRD PROTECTION
1059 " MOVEMENT, MODELS, EVAPORATION, BEHAVIOR, SIMULATIONS, OIL SLICKS, SPREADING
1063 " OCS, DRIFT, SIMULATIONS, OIL SPILLS, PHYSICAL ASPECTS, SEA SURFACE
1114 " MORTALITY, HEALTH HAZARDS, REFINERIES, STATISTICAL ANALYSIS, *REFINERY WORKERS
1119 " FISHERIES, SOCIOECONOMIC EFFECTS, PIPELINES, UK, *SHETLAND ISLANDS
1121 " GUIDELINES, REGULATIONS, REFINERIES, TANKERS
1122 " OFFSHORE, FISHERIES, REGULATIONS, UK
1129 " MICROORGANISMS, LEGISLATION, CHEMICAL EFFECTS
1131 " NORTH SEA, GOVERNMENT AGENCIES, EKOFISK BLOWOUT, CONTINGENCY PLANNING, POLLUTION CONTROL, SAFETY
1132 " OFFSHORE, GEORGES BANK, FISHERIES, ENVIRONMENTAL EFFECTS, EIS, ATLANTIC OCEAN, PRODUCTION
1136 " DISPOSAL , REFINERIES, US, WASTE TREATMENT, WASTEWATERS, SLUDGE , SOLID WASTES
1137 " OFFSHORE, ENVIRONMENTAL EFFECTS, CONTAMINATION, SOCIOECONOMIC EFFECTS, ONSHORE, VENEZUELA
1139 " ENVIRONMENTAL EFFECTS, DISPOSAL , REFINING, WATER QUALITY, WASTE TREATMENT, RESOURCE MANAGEMENT
1141 " ENVIRONMENTAL EFFECTS, ECONOMICS, PETROLEUM PRODUCTS, OIL TRANSPORT
1142 " OFFSHORE, ECONOMICS, DEVELOPMENT, SOCIOECONOMIC EFFECTS, ONSHORE, RESOURCE MANAGEMENT
1161 " EUROPE, CONTAMINATION, PIPELINES, STATISTICS, SPILL REMOVAL
1173 " EUROPE, ENVIRONMENTAL EFFECTS, WASTE TREATMENT, REFINERIES, POLLUTION CONTROL
1187 " FLOTATION, FILTRATION, EQUIPMENT, ADSORPTION, OIL-WATER SEPARATION, REFINING
1194 " OFFSHORE, NORWAY, FISHERIES, COMPENSATION
1199 " OFFSHORE, DEVELOPMENT, ONSHORE, SCOTLAND, *OIL RELATED UNIVERSITY RESEARCH
0844 OIL REMOVAL, EQUIPMENT, SPILL CLEANUP, SHIPS, OIL-WATER SEPARATION
0866 " HYDROCARBONS , FRESHWATER, OIL-WATER SEPARATION, WSF, RIVERS, *AERATION
0752 OIL SLICKS, MONITORING, EQUIPMENT, DETECTION, SPILL RESPONSE, PRODUCT INFORMATION, *OIL THICKNESS SENSOR
0757 " MOVEMENT, MONITORING, EQUIPMENT, DRIFT, REMOTE SENSING, PRODUCT INFORMATION
0760 " EQUIPMENT, DETECTION, SEA SURFACE, PERFORMANCE TESTING, PRODUCT INFORMATION
0766 " DETECTION, SAMPLING, PERSIAN GULF
0768 " DETECTION, PHYSICAL ASPECTS, *LASER FLUOROSENSORS
0775 " OIL DISCHARGES, HYDROCARBONS , REMOTE SENSING, SHIPS, TANKERS,NATURAL SEEPAGE
0779 " REMOTE SENSING, SEA SURFACE, *LASER FLUOROSENSOR
0785 " NATURAL SEEPAGE, DETECTION, REMOTE SENSING, SANTA BARBARA CHANNEL, *OCEAN COLOR SCANNER
0786 " NATURAL SEEPAGE, MOVEMENT, FATE, DISTRIBUTION, CALIFORNIA, BEHAVIOR, REMOTE SENSING, SANTA BARBARA CHANNEL, *METEOROLOGY, *OCEANOGRAPHY
0792 " ANALYTICAL TECHNIQUES, REMOTE SENSING, PERFORMANCE TESTING, *LASER FLUOROSENSORS
0794 " EQUIPMENT, DETECTION, REMOTE SENSING
0795 " DETECTION, REMOTE SENSING, PHYSICAL ASPECTS, *THICKNESS, *FLUORESCENCE
0796 " MONITORING, ICE, EQUIPMENT, DETECTION, REMOTE SENSING
0832 " MONITORING, MARINE ORGANISMS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, SEDIMENTS
0838 " BOOMS, SPILL CONTAINMENT, PHYSICAL EFFECTS
0953 " BEHAVIOR, PHYSICAL ASPECTS, *SUNLIGHT GLITTER
0956 " SHIPS, PHYSICAL ASPECTS, SEA SURFACE, USN, USCG, SPILL RESPONSE
0958 " FATE, DISPERSION, BEHAVIOR, *OIL ENTRAINMENT, *WATER COLUMN
0959 " MEDITERRANEAN SEA, DISTRIBUTION, CONTAMINATION, ADSORPTION, PHYSICAL ASPECTS, TAR, SEDIMENTS, SEA SURFACE
0960 " DISPERSION, BEHAVIOR, PHYSICAL EFFECTS, *SEA STATE
0961 " ANALYTICAL TECHNIQUES, PHYSICAL ASPECTS
1044 " BEHAVIOR, SPREADING, SEA SURFACE, PHYSICAL ASPECTS
1046 " MODELS, ICE, COLD CLIMATES, BEHAVIOR, ARCTIC, PHYSICAL ASPECTS, PREDICTIONS, SPILL TRAJECTORIES, *WORKSHOP PROCEEDINGS
1051 " FATE, BEHAVIOR, PHYSICAL ASPECTS, SPREADING
1059 " OIL INDUSTRY, MOVEMENT, MODELS, EVAPORATION, BEHAVIOR, SIMULATIONS, SPREADING
1060 " NORTH SEA, MOVEMENT, BLOWOUTS, SIMULATIONS, SPREADING, *SLIKTRACK
1065 " MOVEMENT, ESTUARIES, SIMULATIONS, ST. LAWRENCE RIVER, SPILL TRAJECTORIES
1066 " MODELS, ESTUARIES, COASTAL WATERS, BEHAVIOR, PREDICTIONS, *CIRCULATION MODELING
1071 " MOVEMENT, INDIA, DRIFT, COASTS, SPILL TRAJECTORIES

1072 OIL SLICKS, MODELS, DISTRIBUTION, PREDICTIONS, *THICKNESS
1075 " MOVEMENT, MODELS, BEHAVIOR, PREDICTIONS, SEA SURFACE
1076 " MOVEMENT, MODELS, BEHAVIOR, SPREADING, SEA SURFACE, *HYDRODYNAMIC EQUATIONS
1077 " MODELS, EMULSIONS, PREDICTIONS, DISPERSIONS, SEA SURFACE, *WATER COLUMN
1082 " MODELS, EMULSIFICATION, DISPERSION, BEHAVIOR, USN, USCG, *WAVTOP PROGRAM
1088 " MOVEMENT, MODELS, ARGO MERCHANT SPILL, SIMULATIONS, SPREADING, SEA SURFACE, *SURFACE CURRENTS
1152 " TANKERS, PORTS , SURVEILLANCE, REGULATIONS
0755 OIL SPILLS, MONITORING, DETECTION, SURVEILLANCE
0756 " EQUIPMENT, DETECTION, *LASER FLUORESCENCE
0771 " EQUIPMENT, DETECTION, *SEWERS
0780 " EQUIPMENT, DETECTION, COLD CLIMATES, REMOTE SENSING, *LASERS
0784 " DETECTION, REMOTE SENSING, *LASER-INDUCED LUMINESCENCE
0788 " EQUIPMENT, REMOTE SENSING, PERFORMANCE TESTING
0789 " COASTAL WATERS, REMOTE SENSING, PERFORMANCE TESTING
0793 " EQUIPMENT, DETECTION, DESIGN-ENGINEERING, REMOTE SENSING, USCG, PERFORMANCE TESTING
0816 " ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, *MULTICOMPONENT FLUORESCENCE
0825 " ANALYTICAL TECHNIQUES, SOURCE IDENTIFICATION, *MULTICOMPONENT FLUORESCENCE
0827 " OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, SWEDEN, ONSHORE, REFINERIES, OIL TRANSFER, TANKERS, SHIPS
0899 " IXTOC 1 BLOWOUT, GULF OF MEXICO, ECONOMICS, POLLUTION CONTROL, SOCIOECONOMIC EFFECTS
0908 " CANADA, ARCTIC, POLLUTION CONTROL, STATISTICS, SPILL RESPONSE
0962 " ENVIRONMENTAL EFFECTS, ECOSYSTEMS, ECONOMICS, COMPENSATION, SOCIOECONOMIC EFFECTS
0996 " MARINE ENVIRONMENT, FATE, EQUIPMENT, ENVIRONMENTAL EFFECTS, SPILL CLEANUP
1009 " INTERTIDAL ZONE, CHEMICAL EFFECTS, BIOLOGICAL EFFECTS, PHYSICAL EFFECTS, *EXPERIMENTAL DESIGN
1029 " BIODEGRADATION, BACTERIA
1058 " OFFSHORE, MOVEMENT, DEVELOPMENT, BEAUFORT SEA, PREDICTIONS, *STORM SURGES
1063 " OIL INDUSTRY, OCS, DRIFT, SIMULATIONS, PHYSICAL ASPECTS, SEA SURFACE
1079 " MODELS, DISPERSION, PHYSICAL ASPECTS, SEA SURFACE, *BREAKING WAVES
1080 " MOVEMENT, ICE, DISTRIBUTION, PREDICTIONS, *ICE COMPACTNESS
1083 " MODELS, FATE, BEHAVIOR, SIMULATIONS, PHYSICAL EFFECTS
1149 " GULF OF MEXICO, TANKERS, *ISTANBUL
1160 " NORTH SEA, CONTAMINATION, PIPELINES, US
1163 " GROUNDWATER, EUROPE, CRUDE OIL, CONTAMINATION, PIPELINES, OIL TRANSPORT, TRANS-ALASKA PIPELINE, STATISTICS, SOIL
1166 " MONITORING, EQUIPMENT, DETECTION, TANKERS, OIL TRANSFER, PRODUCT INFORMATION
1153 OIL TANKS, CRUDE OIL WASHING, TANKERS, PERSONNEL TRAINING
1146 OIL TERMINALS, OFFSHORE, MONITORING, ENVIRONMENTAL EFFECTS, DEVELOPMENT, CONTINGENCY PLANNING, PRODUCTION, PLATFORMS
1196 " ENVIRONMENTAL EFFECTS, DESIGN-ENGINEERING, UK, *VISUAL IMPACT
0827 OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, SWEDEN, ONSHORE, REFINERIES, TANKERS, SHIPS
1002 " HYDROCARBONS , GROUNDWATER, CONTAMINATION
1081 " SIMULATIONS, POLLUTION PREVENTION, TANKERS, SHIPS
1097 " MOVEMENT, MARINE ENVIRONMENT, SOURCES, POLLUTION CONTROL
1165 " HARBORS, CONTINGENCY PLANNING, PORTS , TANKERS, SPILL RESPONSE, PERSONNEL TRAINING, UK
1166 " OIL SPILLS, MONITORING, EQUIPMENT, DETECTION, TANKERS, PRODUCT INFORMATION
0900 OIL TRANSPORT, INTERNATIONAL AGREEMENTS, COASTAL WATERS, POLLUTION PREVENTION, POLLUTION CONTROL, *CONFERENCE, *MIDDLE EAST
0903 " IMCO, EQUIPMENT, CANADA, POLLUTION CONTROL, SKIMMERS, SORBENTS, SHIPS, PERSONNEL TRAINING
0913 " MANUALS, LEGISLATION, EXPLORATION, EQUIPMENT, POLLUTION PREVENTION, PRODUCTION, REFINING, STORAGE
0975 " OCS, INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA , STATISTICS
0976 " OCS, INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA , STATISTICS
0993 " MONITORING, MARINE ENVIRONMENT, DETECTION, CONTAMINATION, POLLUTION CONTROL, REFINING, *TURKEY
1141 " OIL INDUSTRY, ENVIRONMENTAL EFFECTS, ECONOMICS, PETROLEUM PRODUCTS
1143 " OIL-GAS LEASING, OFFSHORE, MODELS, EXPLORATION, CALIFORNIA, RISK ANALYSIS, SPILL TRAJECTORIES
1145 " OFFSHORE, LEGISLATION, INTERNATIONAL AGREEMENTS, EXPLORATION, EUROPE, ENVIRONMENTAL EFFECTS, ONSHORE, PRODUCTION, WASTE OIL, *UNEP
1158 " LIABILITY, INTERNATIONAL CONVENTIONS, IMCO, COMPENSATION, SHIPS, TANKERS, REGULATIONS, SAFETY
1159 " AFRICA, TANKERS, STATISTICS, *CAPE OF GOOD HOPE, *1968-1980 TANKER SPILLS
1163 " OIL SPILLS, GROUNDWATER, EUROPE, CRUDE OIL, CONTAMINATION, PIPELINES, TRANS-ALASKA PIPELINE, STATISTICS, SOIL
1168 " POLLUTION CONTROL, PRODUCTION, OIL STORAGE, SPILL CLEANUP, SPILL RESPONSE
1169 " IMCO, BALLAST , TANKERS, SHIPS, POLLUTION CONTROL
1170 " FILTRATION, AMOCO CADIZ SPILL, WASTE OIL, SPILL REMOVAL, SPILL DISPOSAL, REUSE

0844 OIL-WATER SEPARATION, OIL REMOVAL, EQUIPMENT, SPILL CLEANUP, SHIPS
0866 " OIL REMOVAL, HYDROCARBONS , FRESHWATER, WSP, RIVERS, *AERATION
0869 " EQUIPMENT, DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP, SKIMMERS, PERFORMANCE TESTING, PRODUCT INFORMATION
1172 " FILTRATION, WASTEWATERS
1180 " EMULSIONS, WASTEWATER TREATMENT, PATENT, *MAGNETIC SEPARATION
1183 " INCO, FILTRATION, EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, COALESCENCE, PERFORMANCE TESTING, PRODUCT INFORMATION
1184 " FILTRATION, EMULSIONS, WASTE OIL, *MEMBRANES
1185 " FILTRATION, EQUIPMENT, DESIGN-ENGINEERING, COALESCENCE, WASTEWATERS, PATENT
1186 " OIL DISCHARGES, MOLLUSKS, FISH, BIOASSAY, REGULATIONS, WASTEWATERS
1187 " OIL INDUSTRY, FLOTATION, FILTRATION, EQUIPMENT, ADSORPTION, REFINING
1188 " MONITORING, EQUIPMENT, COST ANALYSIS, PERFORMANCE TESTING, PRODUCT INFORMATION
1189 " EQUIPMENT, COST ANALYSIS, CONTAMINATION, PRODUCT INFORMATION, PERFORMANCE TESTING
1190 " FILTRATION, EQUIPMENT, DESIGN-ENGINEERING, PRODUCT INFORMATION
0827 ONSHORE, OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, SWEDEN, REFINERIES, TANKERS, SHIPS
0874 " LAKES , FRESHWATER, CANADA, SPILL CLEANUP, SPILL RESPONSE, RIVERS
0931 " INTERTIDAL ZONE, FRANCE, ECOSYSTEMS, COASTS, BENTHOS, AMOCO CADIZ SPILL, SAMPLING
1137 " OIL INDUSTRY, OFFSHORE, ENVIRONMENTAL EFFECTS, CONTAMINATION, SOCIOECONOMIC EFFECTS, VENEZUELA
1142 " OIL INDUSTRY, OFFSHORE, ECONOMICS, DEVELOPMENT, SOCIOECONOMIC EFFECTS, RESOURCE MANAGEMENT
1145 " OIL TRANSPORT, OFFSHORE, LEGISLATION, INTERNATIONAL AGREEMENTS, EXPLORATION, EUROPE, ENVIRONMENTAL EFFECTS, PRODUCTION, WASTE OIL, *UNEP
1198 " OFFSHORE, INTERNATIONAL CONVENTIONS, EXPLORATION, EUROPE, ANTARCTICA
1199 " OIL INDUSTRY, OFFSHORE, DEVELOPMENT, SCOTLAND, *OIL RELATED UNIVERSITY RESEARCH
1164 OREGON, GRAVITY SEPARATION, PORTS , WASTEWATER TREATMENT, SHIPS
0817 OXIDATION, FATE, COASTAL WATERS, BLACK SEA, TAR, WEATHERING, USSR
1021 " BIODEGRADATION, SEDIMENTS, PHYSICAL ASPECTS
1035 " HYDROCARBONS , BIODEGRADATION, TOXICITY, UPTAKE, *ALIPHATICS
1037 " MICROORGANISMS, BIODEGRADATION, WEATHERING, USSR
1171 " OIL FIELDS, COASTAL WATERS, CALIFORNIA, REFINERIES, WASTEWATER TREATMENT
0799 PACIFIC COAST, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, SAMPLING, WASHINGTON, PUGET SOUND
0971 " EIS, ECONOMICS, CANADA, RISK ANALYSIS, SOCIOECONOMIC EFFECTS, PORTS , SPILL RESPONSE, WASHINGTON
1162 " ENVIRONMENTAL EFFECTS, PIPELINES, PORTS , RISK ANALYSIS, WASHINGTON
0800 PACIFIC OCEAN, CRUDE OIL, CONCENTRATIONS, CHEMICAL ANALYSIS, CANADA, SAMPLING, SEAWATER, SPECTROSCOPY
1102 " OCS, FISH, DEVELOPMENT, BEHAVIOR, SUBLETHAL EFFECTS
0754 PAH, MONITORING, ANALYTICAL TECHNIQUES, ABSORPTION
0765 " MOLLUSKS, INVERTEBRATES, FISH, COASTAL WATERS, BENTHOS, SAMPLING, SEDIMENTS, *MALTA
0801 " FISH, DISTRIBUTION, CONCENTRATIONS, CARCINOGENS, SAMPLING, *CREOSOTE
0809 " MOLLUSKS, CHROMATOGRAPHY, CHEMICAL ANALYSIS, *OYSTERS
0820 " HYDROCARBONS , CONTAMINATION, CONCENTRATIONS, CHEMICAL ANALYSIS, ANTARCTICA, SEDIMENTS
0918 " METABOLISM, INVERTEBRATES, TOXICITY, *LITTLE SKATE
0944 " MICROORGANISMS, HEALTH HAZARDS, CARCINOGENS, BOOK REVIEW, MAMMALS
0947 " CRUSTACEANS, UPTAKE, *DAPHNIA, PULEX
1006 " MUTAGENS, METABOLISM, CONTAMINATION, CHEMICAL ANALYSIS, CARCINOGENS, BIOLOGICAL EFFECTS, BIBLIOGRAPHIES, ANALYTICAL TECHNIQUES
1025 " MICROORGANISMS, DETECTION, COASTS, BIODEGRADATION, BENTHOS, ANNELIDS, SEDIMENTS
1100 " METABOLISM, HYDROCARBONS , FISH, UPTAKE, *SALMON
1134 " HYDROCARBONS , FATE, ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONCENTRATIONS, PETROLEUM PRODUCTS, TOXICITY
0836 PATENT, DISPOSAL , WASTE OIL TREATMENT, SLUDGE
1175 " FILTRATION, EQUIPMENT, EMULSIONS, DESIGN-ENGINEERING, COALESCENCE, WASTEWATER TREATMENT
1180 " OIL-WATER SEPARATION, EMULSIONS, WASTEWATER TREATMENT, *MAGNETIC SEPARATION
1181 " FLOTATION, FILTRATION, WASTEWATER TREATMENT, REFINERIES, PETROCHEMICALS, *COAGULATION
1182 " FILTRATION, WASTE OIL TREATMENT, SLUDGE , *SOLIDIFICATION
1185 " OIL-WATER SEPARATION, FILTRATION, EQUIPMENT, DESIGN-ENGINEERING, COALESCENCE, WASTEWATERS
0760 PERFORMANCE TESTING, OIL SLICKS, EQUIPMENT, DETECTION, SEA SURFACE, PRODUCT INFORMATION
0767 " MONITORING, EQUIPMENT, WASTEWATERS, SHIPS, TANKERS, UK
0788 " OIL SPILLS, EQUIPMENT, REMOTE SENSING
0789 " OIL SPILLS, COASTAL WATERS, REMOTE SENSING
0792 " OIL SLICKS, ANALYTICAL TECHNIQUES, REMOTE SENSING, *LASER FLUOROSENSORS
0793 " OIL SPILLS, EQUIPMENT, DETECTION, DESIGN-ENGINEERING, REMOTE SENSING, USCG
0834 " EQUIPMENT, DESIGN-ENGINEERING, BOOMS, BEHAVIOR, SPILL CONTAINMENT, PHYSICAL EFFECTS
0845 " EQUIPMENT, SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, *ELENI V SPILL
0856 " SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, *BRAVO BLOWOUT

0869 PERFORMANCE TESTING, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION
0873 " EQUIPMENT, COST ANALYSIS, SPILL REMOVAL, SORBENTS, PRODUCT INFORMATION
0891 " ICE, COLD CLIMATES, BURNING, SPILL RESPONSE
0920 " DISPERSANTS, BEACHES, TOXICITY, SEAWATER, UK
1183 " OIL-WATER SEPARATION, INCO, FILTRATION, EQUIPMENT, DISPERSION, DESIGN-ENGINEERING, COALESCENCE, PRODUCT INFORMATION
1188 " OIL-WATER SEPARATION, MONITORING, EQUIPMENT, COST ANALYSIS, PRODUCT INFORMATION
1189 " OIL-WATER SEPARATION, EQUIPMENT, COST ANALYSIS, CONTAMINATION, PRODUCT INFORMATION
0766 PERSIAN GULF, OIL SLICKS, DETECTION, SAMPLING
0877 PERSONNEL TRAINING, GOVERNMENT AGENCIES, CONTINGENCY PLANNING, COASTS, CANADA, US, SPILL RESPONSE, *WORKSHOP
0878 " EQUIPMENT, POLLUTION CONTROL, SPILL RESPONSE, UK
0887 " MANUALS, GUIDELINES, EQUIPMENT, BEACHES, SPILL CLEANUP, SHORELINES
0889 " ICE, FATE, CONTINGENCY PLANNING, COLD CLIMATES, CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , SPILL RESPONSE, US, *WORKSHOP
0903 " OIL TRANSPORT, INCO, EQUIPMENT, CANADA, POLLUTION CONTROL, SKIMMERS, SORBENTS, SHIPS
0906 " INFORMATION SYSTEMS, FRANCE, EQUIPMENT, CONTINGENCY PLANNING, SPILL CLEANUP, SPILL RESPONSE
0912 " OIL INDUSTRY, DRILLING, BLOWOUT PREVENTION, POLLUTION CONTROL, PLATFORMS, SAFETY, *UNEP
1062 " INFORMATION SYSTEMS, EQUIPMENT, CONTINGENCY PLANNING, SIMULATIONS, SPILL RESPONSE
1153 " OIL TANKS, CRUDE OIL WASHING, TANKERS
1165 " OIL TRANSFER, HARBORS, CONTINGENCY PLANNING, PORTS , TANKERS, SPILL RESPONSE, UK
1181 PETROCHEMICALS, PATENT, FLOTATION, FILTRATION, WASTEWATER TREATMENT, REFINERIES, *COAGULATION
0774 PETROLEUM PRODUCTS, DETECTION, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES, SPECTROMETRY
0819 " NORTH SEA, BALTIC SEA, SAMPLING, SEAWATER
0830 " INTERNATIONAL CONVENTIONS, CONTAMINATION, SOURCE IDENTIFICATION, POLLUTION CONTROL, USSR
0833 " GROUNDWATER, CONTAMINATION, CHEMICAL EFFECTS, SOURCE IDENTIFICATION
0919 " MORTALITY, FUEL OIL, CONCENTRATIONS, ALGAE, TOXICITY, *SYNECHOCYSTIS AQUATILIS
0936 " MICROORGANISMS, MARINE ORGANISMS, BIOLOGICAL EFFECTS
0951 " MOLLUSKS, MARINE ORGANISMS, BENTHOS, SURFACTANTS
1011 " MARINE ENVIRONMENT, CONTAMINATION
1026 " MICROORGANISMS, INDUSTRIES, BIODEGRADATION
1040 " MICROORGANISMS, METABOLISM, HYDROCARBONS , CRUDE OIL, BIODEGRADATION, AROMATIC HYDROCARBONS
1134 " PAH, HYDROCARBONS , FATE, ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONCENTRATIONS, TOXICITY
1141 " OIL TRANSPORT, OIL INDUSTRY, ENVIRONMENTAL EFFECTS, ECONOMICS
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0795 " OIL SLICKS, DETECTION, REMOTE SENSING, *THICKNESS, *FLUORESCENCE
0953 " OIL SLICKS, BEHAVIOR, *SUNLIGHT GLITTER
0954 " HYDROCARBONS , ADSORPTION, SEDIMENTS, TAR, *AUTOPURIFICATION
0956 " OIL SLICKS, SHIPS, SEA SURFACE, USN, USCG, SPILL RESPONSE
0959 " OIL SLICKS, MEDITERRANEAN SEA, DISTRIBUTION, CONTAMINATION, ADSORPTION, TAR, SEDIMENTS, SEA SURFACE
0961 " OIL SLICKS, ANALYTICAL TECHNIQUES
1021 " OXIDATION, BIODEGRADATION, SEDIMENTS
1042 " HYDROCARBONS , FATE, EVAPORATION
1044 " OIL SLICKS, BEHAVIOR, SPREADING, SEA SURFACE
1046 " OIL SLICKS, MODELS, ICE, COLD CLIMATES, BEHAVIOR, ARCTIC, PREDICTIONS, SPILL TRAJECTORIES, *WORKSHOP PROCEEDINGS
1047 " NATURAL SEEPAGE, MOVEMENT, FATE, CALIFORNIA, BEHAVIOR, SOURCES, SEA SURFACE, SANTA BARBARA CHANNEL, *OCEANOGRAPHY
1048 " MOVEMENT, ICE, COLD CLIMATES, CANADA, BEHAVIOR, *RESEARCH REVIEW
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1051 " OIL SLICKS, FATE, BEHAVIOR, SPREADING
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1055 " ICE, FATE, BEHAVIOR
1057 " GROUNDWATER, FUEL OIL, FATE, WEATHERING
1063 " OIL SPILLS, OIL INDUSTRY, OCS, DRIFT, SIMULATIONS, SEA SURFACE
1079 " OIL SPILLS, MODELS, DISPERSION, SEA SURFACE, *BREAKING WAVES
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1056 PHYSICAL EFFECTS, EMULSIFICATION, CRUDE OIL, BEHAVIOR, *TURBULENCE
1083 " OIL SPILLS, MODELS, FATE, BEHAVIOR, SIMULATIONS
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0888 " METULA SPILL, CONTINGENCY PLANNING, SPILL RESPONSE, *JACOB MAERSK SPILL
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0908 " OIL SPILLS, CANADA, ARCTIC, STATISTICS, SPILL RESPONSE
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0796 " OIL SLICKS, MONITORING, ICE, EQUIPMENT, DETECTION
0924 REPRODUCTION, MORTALITY, MOLLUSKS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS, SUBLETHAL EFFECTS
1135 RESOURCE MANAGEMENT, PRODUCTION, OFFSHORE, EUROPE, ENVIRONMENTAL EFFECTS, *EEC
1139 " REFINING, OIL INDUSTRY, ENVIRONMENTAL EFFECTS, DISPOSAL , WATER QUALITY, WASTE TREATMENT
1142 " ONSHORE, OIL INDUSTRY, OFFSHORE, ECONOMICS, DEVELOPMENT, SOCIOECONOMIC EFFECTS
1193 " RECYCLING, DISPOSAL , WASTE OIL, US
0875 RESTORATION, RECOVERY, BIRDS, *SEABIRD REHABILITATION
0876 " POLLUTION CONTROL, CANADA, BIRDS, WILDLIFE
0895 " MANUALS, GUIDELINES, EPA, CONTINGENCY PLANNING, SPILL RESPONSE, SPILL CLEANUP, SHORELINES
0965 " BIRDS, *SEABIRD RESCUE
0966 " MORTALITY, BIRDS, UK
0967 " RECOVERY, ESTUARIES, CANADA, BIOLOGICAL EFFECTS, BAYS, SEDIMENTS, *CHEDABUCTO BAY SPILL
1039 " RECOVERY, GROUNDWATER, EMULSIFICATION, BIODEGRADATION, SPILL CLEANUP, SOIL
1170 REUSE, OIL TRANSPORT, FILTRATION, AMOCO CADIZ SPILL, WASTE OIL, SPILL REMOVAL, SPILL DISPOSAL
1191 " RECYCLING, RECLAMATION, ENVIRONMENTAL EFFECTS, DISPOSAL , BIBLIOGRAPHIES, WASTE OIL TREATMENT
0971 RISK ANALYSIS, PORTS , PACIFIC COAST, EIS, ECONOMICS, CANADA, SOCIOECONOMIC EFFECTS, SPILL RESPONSE, WASHINGTON
0973 " GULF OF ALASKA, COASTS, BASELINE STUDIES, SEDIMENTATION, SHORELINES, *SPILL VULNERABILITY
1064 " PREDICTIONS, OIL-GAS LEASING, OCS, GULF OF ALASKA, *KODIAK ISLAND LEASE AREA
1087 " PREDICTIONS, OIL-GAS LEASING, OCS, GULF OF ALASKA, *KODIAK ISLAND LEASE AREA
1116 " OCS, NOAA, DEVELOPMENT, BLM, ALASKA
1143 " OIL TRANSPORT, OIL-GAS LEASING, OFFSHORE, MODELS, EXPLORATION, CALIFORNIA, SPILL TRAJECTORIES
1162 " PORTS , PIPELINES, PACIFIC COAST, ENVIRONMENTAL EFFECTS, WASHINGTON
0866 RIVERS, OIL-WATER SEPARATION, OIL REMOVAL, HYDROCARBONS , FRESHWATER, MSF, *AERATION
0872 " ICE, COLD CLIMATES, CANADA, SPILL CONTAINMENT, SPILL CLEANUP
0874 " ONSHORE, LAKES , FRESHWATER, CANADA, SPILL CLEANUP, SPILL RESPONSE

1043 RIVERS, ICE, COLD CLIMATES, BUZZARDS BAY, BEHAVIOR, *ETHEL H SPILL, *HUDSON RIVER
0912 SAFETY, POLLUTION CONTROL, PLATFORMS, PERSONNEL TRAINING, OIL INDUSTRY, DRILLING, BLOWOUT PREVENTION, *UNEP
1128 " PLATFORMS, OFFSHORE, MONITORING, ENVIRONMENTAL EFFECTS, *UNDERWATER INSPECTION
1131 " POLLUTION CONTROL, OIL INDUSTRY, NORTH SEA, GOVERNMENT AGENCIES, EKOFISK BLOWOUT, CONTINGENCY PLANNING
1156 " REGULATIONS, POLLUTION PREVENTION, TANKERS
1158 " REGULATIONS, OIL TRANSPORT, LIABILITY, INTERNATIONAL CONVENTIONS, IMCO, COMPENSATION, SHIPS, TANKERS
0753 SAMPLING, MONITORING, HYDROCARBONS , DISTRIBUTION, CONTAMINATION, COASTS, CHEMICAL ANALYSIS, BAYS, WSF, *ADRIATIC SEA
0763 " MONITORING, MOLLUSKS, MICROORGANISMS, MEDITERRANEAN SEA, CONCENTRATIONS, BLACK SEA, BIODEGRADATION, USSR
0765 " PAH, MOLLUSKS, INVERTEBRATES, FISH, COASTAL WATERS, BENTHOS, SEDIMENTS, *MALTA
0766 " PERSIAN GULF, OIL SLICKS, DETECTION
0797 " NOAA, NATURAL SEEPAGE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, SEAWATER, WEATHERING
0799 " PUGET SOUND, PACIFIC COAST, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, WASHINGTON
0800 " PACIFIC OCEAN, CRUDE OIL, CONCENTRATIONS, CHEMICAL ANALYSIS, CANADA, SEAWATER, SPECTROSCOPY
0801 " PAH, FISH, DISTRIBUTION, CONCENTRATIONS, CARCINOGENS, *CREOSOTE
0803 " MEDITERRANEAN SEA, DRILLING, DISTRIBUTION, COASTAL WATERS, BEACHES, TAR, ZOOPLANKTON, *NEUSTON
0804 " MEDITERRANEAN SEA, HYDROCARBONS , CONTAMINATION, CONCENTRATIONS, WSF, SEA SURFACE
0808 " INDIAN OCEAN, HYDROCARBONS , DETECTION, CONCENTRATIONS, COASTS, TANKERS
0811 " DETECTION, CONCENTRATIONS, BERMUDA, TAR, SEAWATER
0813 " HYDROCARBONS , CONCENTRATIONS, BALTIC SEA, SEAWATER, SEDIMENTS
0814 " PLATFORMS, OCS, HYDROCARBONS , DRILLING, DISTRIBUTION, CONCENTRATIONS, SEDIMENTS, TEXAS
0815 " PLATFORMS, MARINE ORGANISMS, DRILLING, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS, SEDIMENTS
0819 " PETROLEUM PRODUCTS, NORTH SEA, BALTIC SEA, SEAWATER
0821 " MEDITERRANEAN SEA, CONTAMINATION, CONCENTRATIONS, TAR, SEA SURFACE
0822 " PORTS , PIPELINES, HYDROCARBONS , HARBORS, CONCENTRATIONS, COASTAL WATERS, ALASKA , SEDIMENTS, TANKERS
0826 " PRODUCTION, OFFSHORE, NATURAL SEEPAGE, EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, TAR, SOURCES, SANTA BARBARA CHANNEL
0828 " OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR, SEA SURFACE, TANKERS, SPAIN
0931 " ONSHORE, INTERTIDAL ZONE, FRANCE, ECOSYSTEMS, COASTS, BENTHOS, AMOCO CADIZ SPILL
1103 " PLATFORMS, OIL FIELDS, OCS, GULF OF MEXICO, BACTERIA, TOXICITY
0782 SANTA BARBARA CHANNEL, REMOTE SENSING, NATURAL SEEPAGE, MONITORING, DETECTION, CALIFORNIA, TAR, SOURCES, *GEOLOGY, *OCEANOGRAPHY
0785 " REMOTE SENSING, OIL SLICKS, NATURAL SEEPAGE, DETECTION, *OCEAN COLOR SCANNER
0786 " REMOTE SENSING, OIL SLICKS, NATURAL SEEPAGE, MOVEMENT, FATE, DISTRIBUTION, CALIFORNIA, BEHAVIOR, *METEOROLOGY, *OCEANOGRAPHY
0826 " SAMPLING, PRODUCTION, OFFSHORE, NATURAL SEEPAGE, EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, TAR, SOURCES
0829 " NATURAL SEEPAGE, INTERTIDAL ZONE, COASTS, CALIFORNIA, BEACHES, SOURCE IDENTIFICATION, TAR, *ASPHALT DEPOSITS
0963 " RECYCLING, NATURAL SEEPAGE, LUBRICATING OIL, CRUDE OIL, CALIFORNIA, *WESSON OIL, *SENSUALITY INDEX
1047 " PHYSICAL ASPECTS, NATURAL SEEPAGE, MOVEMENT, FATE, CALIFORNIA, BEHAVIOR, SOURCES, SEA SURFACE, *OCEANOGRAPHY
1093 " NATURAL SEEPAGE, HYDROCARBONS , FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, SOURCES, TAR
1094 " OFFSHORE, NATURAL SEEPAGE, FATE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, TAR, SOURCES
1095 " OCS, NATURAL SEEPAGE, FATE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, SOURCES, *GEOLOGY
1138 " REFINERIES, PRODUCTION, PLATFORMS, OFFSHORE, GULF OF MEXICO, ENVIRONMENTAL EFFECTS, BERMUDA, VENEZUELA
1199 SCOTLAND, ONSHORE, OIL INDUSTRY, OFFSHORE, DEVELOPMENT, *OIL RELATED UNIVERSITY RESEARCH
0760 SEA SURFACE, PRODUCT INFORMATION, PERFORMANCE TESTING, OIL SLICKS, EQUIPMENT, DETECTION
0779 " REMOTE SENSING, OIL SLICKS, *LASER FLUOROSENSOR
0804 " SAMPLING, MEDITERRANEAN SEA, HYDROCARBONS , CONTAMINATION, CONCENTRATIONS, WSF
0821 " SAMPLING, MEDITERRANEAN SEA, CONTAMINATION, CONCENTRATIONS, TAR
0828 " SAMPLING, OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, SOURCE IDENTIFICATION, TAR, TANKERS, SPAIN
0952 " MOVEMENT, ICE, DRIFT, COASTS, ARCTIC, ALASKA , SPILL TRAJECTORIES, *CURRENTS, *METEOROLOGY
0956 " PHYSICAL ASPECTS, OIL SLICKS, SHIPS, USN, USCG, SPILL RESPONSE
0957 " NOAA, ICE, BLM, ARCTIC, *OIL ENTRAINMENT, *SEASONAL VARIATIONS, *NORCOR/OCS

0959 SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, MEDITERRANEAN SEA, DISTRIBUTION, CONTAMINATION, ADSORPTION, TAR, SEDIMENTS
0972 " PREDICTIONS, OCS, MONITORING, FATE, DRIFT, BERING SEA, BASELINE STUDIES, SPILL TRAJECTORIES
1044 " PHYSICAL ASPECTS, OIL SLICKS, BEHAVIOR, SPREADING
1047 " SANTA BARBARA CHANNEL, PHYSICAL ASPECTS, NATURAL SEEPAGE, MOVEMENT, FATE, CALIFORNIA, BEHAVIOR, SOURCES, *OCEANOGRAPHY
1063 " PHYSICAL ASPECTS, OIL SPILLS, OIL INDUSTRY, OCS, DRIFT, SIMULATIONS
1067 " PREDICTIONS, SPILL TRAJECTORIES, *NEAR-SURFACE CURRENTS
1073 " PREDICTIONS, MOVEMENT, DISTRIBUTION, BEHAVIOR
1075 " PREDICTIONS, OIL SLICKS, MOVEMENT, MODELS, BEHAVIOR
1076 " OIL SLICKS, MOVEMENT, MODELS, BEHAVIOR, SPREADING, *HYDRODYNAMIC EQUATIONS
1077 " PREDICTIONS, OIL SLICKS, MODELS, EMULSIONS, DISPERSIONS, *WATER COLUMN
1079 " PHYSICAL ASPECTS, OIL SPILLS, MODELS, DISPERSION, *BREAKING WAVES
1088 " OIL SLICKS, MOVEMENT, MODELS, ARGO MERCHANT SPILL, SIMULATIONS, SPREADING, *SURFACE CURRENTS
0770 SEAWATER, MARINE ORGANISMS, HYDROCARBONS , GULF OF MEXICO, CONCENTRATIONS, CARIBBEAN SEA, WSF
0797 " SAMPLING, NOAA, NATURAL SEEPAGE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CARIBBEAN SEA, ATLANTIC OCEAN, WEATHERING
0800 " SAMPLING, PACIFIC OCEAN, CRUDE OIL, CONCENTRATIONS, CHEMICAL ANALYSIS, CANADA, SPECTROSCOPY
0802 " FRESHWATER, CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES, SPECTROSCOPY, SOURCE IDENTIFICATION
0811 " SAMPLING, DETECTION, CONCENTRATIONS, BERMUDA, TAR
0813 " SAMPLING, HYDROCARBONS , CONCENTRATIONS, BALTIC SEA, SEDIMENTS
0819 " SAMPLING, PETROLEUM PRODUCTS, NORTH SEA, BALTIC SEA
0920 " PERFORMANCE TESTING, DISPERSANTS, BEACHES, TOXICITY, UK
1022 " MEDITERRANEAN SEA, DISTRIBUTION, CONCENTRATIONS, BIODEGRADATION, BACTERIA, SEDIMENTS, *DETERGENTS
1031 " MOLLUSKS, MICROORGANISMS, MARINE ORGANISMS, CRUDE OIL, BIODEGRADATION, *NEMATODES, *POLYCHAETES, *SUBSTRATES
1034 " CRUDE OIL, BIODEGRADATION, *STEEL CORROSION RESISTANCE
1054 " PHYSICAL EFFECTS, ICE, CRUDE OIL, BEHAVIOR, ARCTIC
1108 " MICROORGANISMS, CRUDE OIL, COLD CLIMATES, BIODEGRADATION, UPTAKE, SEDIMENTS
1109 " HYDROCARBONS , CRUSTACEANS, BIOINDICATORS, *CANCER MAGISTER, *CHEMORECEPTION
0973 SEDIMENTATION, RISK ANALYSIS, GULF OF ALASKA, COASTS, BASELINE STUDIES, SHORELINES, *SPILL VULNERABILITY
1010 " ENVIRONMENTAL EFFECTS, DISTRIBUTION, URQUIOLA SPILL
0765 SEDIMENTS, SAMPLING, PAH, MOLLUSKS, INVERTEBRATES, FISH, COASTAL WATERS, BENTHOS, *MALTA
0805 " OCS, MASSACHUSETTS, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, ATLANTIC COAST, SOURCES
0813 " SEAWATER, SAMPLING, HYDROCARBONS , CONCENTRATIONS, BALTIC SEA
0814 " SAMPLING, PLATFORMS, OCS, HYDROCARBONS , DRILLING, DISTRIBUTION, CONCENTRATIONS, TEXAS
0815 " SAMPLING, PLATFORMS, MARINE ORGANISMS, DRILLING, CHEMICAL ANALYSIS, BIOLOGICAL EFFECTS
0818 " MOLLUSKS, MARINE ORGANISMS, DISTRIBUTION, CONCENTRATIONS, CHEMICAL ANALYSIS, *SULFUR COMPOUNDS
0820 " PAH, HYDROCARBONS , CONTAMINATION, CONCENTRATIONS, CHEMICAL ANALYSIS, ANTARCTICA
0822 " SAMPLING, PORTS , PIPELINES, HYDROCARBONS , HARBORS, CONCENTRATIONS, COASTAL WATERS, ALASKA , TANKERS
0823 " HYDROCARBONS , GC/MS, DETECTION, CHEMICAL ANALYSIS, BIOGENIC HYDROCARBONS, *GULF OF CALIFORNIA
0824 " OFFSHORE, HYDROCARBONS , HARBORS, COASTS, CHEMICAL ANALYSIS, BERMUDA
0832 " OIL SLICKS, MONITORING, MARINE ORGANISMS, CHROMATOGRAPHY, SOURCE IDENTIFICATION
0954 " PHYSICAL ASPECTS, HYDROCARBONS , ADSORPTION, TAR, *AUTOPURIFICATION
0959 " SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, MEDITERRANEAN SEA, DISTRIBUTION, CONTAMINATION, ADSORPTION, TAR
0967 " RESTORATION, RECOVERY, ESTUARIES, CANADA, BIOLOGICAL EFFECTS, BAYS, *CHEDABUCTO BAY SPILL
0977 " MICROORGANISMS, GULF OF ALASKA, BIODEGRADATION, BASELINE STUDIES
0997 " INTERTIDAL ZONE, ENVIRONMENTAL EFFECTS, CHILE, BEACHES, *NORTHERN BREEZE SPILL
1016 " NARRAGANSETT BAY, MASSACHUSETTS, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, CRUSTACEANS, CONTAMINATION
1017 " ESTUARIES, ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, BIODEGRADATION, SOURCES
1021 " PHYSICAL ASPECTS, OXIDATION, BIODEGRADATION
1022 " SEAWATER, MEDITERRANEAN SEA, DISTRIBUTION, CONCENTRATIONS, BIODEGRADATION, BACTERIA, *DETERGENTS
1024 " MICROORGANISMS, CRUDE OIL, CONNECTICUT, BIODEGRADATION, BEACHES, SPILL CLEANUP, SHORELINES
1025 " PAH, MICROORGANISMS, DETECTION, COASTS, BIODEGRADATION, BENTHOS, ANNELIDS
1092 " HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS

1098 SEDIMENTS, HYDROCARBONS , FOOD WEB, CONTAMINATION, BENTHOS, UPTAKE, MARINE DETRITIVORES
1107 " OCS, FISH, CRUDE OIL, CONTAMINATION, COASTAL WATERS, CHRONIC EFFECTS, BERING SEA,
ALASKA
1108 " SEAWATER, MICROORGANISMS, CRUDE OIL, COLD CLIMATES, BIODEGRADATION, UPTAKE
1126 " PRODUCTION, OFFSHORE, MARINE ORGANISMS, HYDROCARBONS , ENVIRONMENTAL EFFECTS, BLM
1197 " OFFSHORE, DRILLING, CALIFORNIA, *BARIUM
1157 SEGREGATED BALLAST, REGULATIONS, ECONOMIC EFFECTS, DESIGN-ENGINEERING, TANKERS
0767 SHIPS, PERFORMANCE TESTING, MONITORING, EQUIPMENT, WASTEWATERS, TANKERS, UK
0775 " REMOTE SENSING, OIL SLICKS, OIL DISCHARGES, HYDROCARBONS , TANKERS,NATURAL SEEPAGE
0827 " REFINERIES, ONSHORE, OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE,
DRILLING, CONTAMINATION, SOURCE IDENTIFICATION, SWEDEN, TANKERS
0844 " OIL-WATER SEPARATION, OIL REMOVAL, EQUIPMENT, SPILL CLEANUP
0864 " POLLUTION CONTROL, EMULSIONS, DISPOSAL , DESIGN-ENGINEERING, SPILL CLEANUP,
WASTEWATER TREATMENT
0903 " POLLUTION CONTROL, PERSONNEL TRAINING, OIL TRANSPORT, IMCO, EQUIPMENT, CANADA,
SKIMMERS, SORBENTS
0956 " SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, USN, USCG, SPILL RESPONSE
0984 " POLLUTION CONTROL, LIABILITY, WATER QUALITY
1081 " POLLUTION PREVENTION, OIL TRANSFER, SIMULATIONS, TANKERS
1147 " MONITORING, GOVERNMENT AGENCIES, BIRDS, ALASKA , SPILL CLEANUP, *USFWS
1150 " COASTS, BEACHES, GREECE, *IRENE SERENADE SPILL
1158 " SAFETY, REGULATIONS, OIL TRANSPORT, LIABILITY, INTERNATIONAL CONVENTIONS, IMCO,
COMPENSATION, TANKERS
1164 " PORTS , OREGON, GRAVITY SEPARATION, WASTEWATER TREATMENT
1167 " REGULATIONS, OIL DISCHARGES, LEGISLATION, TANKERS
1169 " POLLUTION CONTROL, OIL TRANSPORT, IMCO, BALLAST , TANKERS
0846 SHORELINES, MANUALS, GUIDELINES, EPA, SPILL CLEANUP, SPILL RESPONSE
0887 " PERSONNEL TRAINING, MANUALS, GUIDELINES, EQUIPMENT, BEACHES, SPILL CLEANUP
0895 " RESTORATION, MANUALS, GUIDELINES, EPA, CONTINGENCY PLANNING, SPILL RESPONSE, SPILL
CLEANUP
0973 " SEDIMENTATION, RISK ANALYSIS, GULF OF ALASKA, COASTS, BASELINE STUDIES, *SPILL
VULNERABILITY
1014 " LIABILITY, FRANCE, ENVIRONMENTAL EFFECTS, COASTS, CHRONIC EFFECTS, AMOCO CADIZ
SPILL
1024 " SEDIMENTS, MICROORGANISMS, CRUDE OIL, CONNECTICUT, BIODEGRADATION, BEACHES, SPILL
CLEANUP
1059 SIMULATIONS, OIL SLICKS, OIL INDUSTRY, MOVEMENT, MODELS, EVAPORATION, BEHAVIOR,
SPREADING
1060 " OIL SLICKS, NORTH SEA, MOVEMENT, BLOWOUTS, SPREADING, *SLIKTRACK
1062 " PERSONNEL TRAINING, INFORMATION SYSTEMS, EQUIPMENT, CONTINGENCY PLANNING, SPILL
RESPONSE
1063 " SEA SURFACE, PHYSICAL ASPECTS, OIL SPILLS, OIL INDUSTRY, OCS, DRIFT
1065 " OIL SLICKS, MOVEMENT, ESTUARIES, ST. LAWRENCE RIVER, SPILL TRAJECTORIES
1068 " MODELS, GEORGES BANK, FISHERIES, ENVIRONMENTAL EFFECTS, BEHAVIOR
1069 " FATE, COASTAL WATERS, *POLLUTANT DIFFUSION
1081 " SHIPS, POLLUTION PREVENTION, OIL TRANSFER, TANKERS
1083 " PHYSICAL EFFECTS, OIL SPILLS, MODELS, FATE, BEHAVIOR
1086 " PREDICTIONS, NOAA, MODELS, ENVIRONMENTAL EFFECTS, COASTS, BEHAVIOR, SPILL
TRAJECTORIES
1088 " SEA SURFACE, OIL SLICKS, MOVEMENT, MODELS, ARGO MERCHANT SPILL, SPREADING,
*SURFACE CURRENTS
1200 " PHYSICAL ASPECTS, MODELS, BEHAVIOR, *MATHEMATICAL ANALYSIS
0845 SKIMMERS, PRODUCT INFORMATION, PERFORMANCE TESTING, EQUIPMENT, SPILL CLEANUP, *ELENI V
SPILL
0848 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP
0856 " PRODUCT INFORMATION, PERFORMANCE TESTING, SPILL CLEANUP, *BRAVO BLOWOUT
0859 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP
0860 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP
0862 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP
0863 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP
0865 " PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP, SORBENTS, *ROPE MOPS
0867 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING
0869 " PRODUCT INFORMATION, PERFORMANCE TESTING, OIL-WATER SEPARATION, EQUIPMENT,
DESIGN-ENGINEERING, BOOMS, SPILL CLEANUP
0903 " SHIPS, POLLUTION CONTROL, PERSONNEL TRAINING, OIL TRANSPORT, IMCO, EQUIPMENT,
CANADA, SORBENTS
1177 " WASTEWATER TREATMENT, SORBENTS, *POLYURETHANE FOAM
0836 SLUDGE , PATENT, DISPOSAL , WASTE OIL TREATMENT
1023 " REFINERIES, LAND FARMING, DISPOSAL , BIODEGRADATION, WASTE OIL
1136 " REFINERIES, OIL INDUSTRY, DISPOSAL , US, WASTE TREATMENT, WASTEWATERS, SOLID WASTES
1182 " PATENT, FILTRATION, WASTE OIL TREATMENT, *SOLIDIFICATION
0899 SOCIOECONOMIC EFFECTS, POLLUTION CONTROL, OIL SPILLS, IXTOC 1 BLOWOUT, GULF OF MEXICO,
ECONOMICS
0962 " OIL SPILLS, ENVIRONMENTAL EFFECTS, ECOSYSTEMS, ECONOMICS, COMPENSATION
0964 " FRANCE, COASTS, BEACHES, AMOCO CADIZ SPILL, *TOURISM

0971 SOCIOECONOMIC EFFECTS, RISK ANALYSIS, PORTS , PACIFIC COAST, EIS, ECONOMICS, CANADA, SPILL RESPONSE, WASHINGTON
0981 " REGULATIONS, OIL DISCHARGES, NORWAY, NORTH SEA, EQUIPMENT, CHRONIC EFFECTS, UK
0992 " LEGISLATION, EKOFISK BLOWOUT, COLD CLIMATES, BIOLOGICAL EFFECTS, BENTHOS, WILDLIFE, *AIBS, *PROCEEDINGS
1119 " PIPELINES, OIL INDUSTRY, FISHERIES, UK, *SHETLAND ISLANDS
1137 " ONSHORE, OIL INDUSTRY, OFFSHORE, ENVIRONMENTAL EFFECTS, CONTAMINATION, VENEZUELA
1142 " RESOURCE MANAGEMENT, ONSHORE, OIL INDUSTRY, OFFSHORE, ECONOMICS, DEVELOPMENT
0762 SOIL, DETECTION, CRUDE OIL, CONTAMINATION, CONCENTRATIONS
0812 " GROUNDWATER, FRESHWATER, EMULSIONS, CHEMICAL ANALYSIS, SOLUTION
0929 " CRUDE OIL, CHEMICAL EFFECTS, ARCTIC, *TUNDRA, *SOIL RESPIRATION
1039 " RESTORATION, RECOVERY, GROUNDWATER, EMULSIFICATION, BIODEGRADATION, SPILL CLEANUP
1163 " PIPELINES, OIL TRANSPORT, OIL SPILLS, GROUNDWATER, EUROPE, CRUDE OIL, CONTAMINATION, TRANS-ALASKA PIPELINE, STATISTICS
1136 SOLID WASTES, SLUDGE , REFINERIES, OIL INDUSTRY, DISPOSAL , US, WASTE TREATMENT, WASTEWATERS
0812 SOLUTION, SOIL, GROUNDWATER, FRESHWATER, EMULSIONS, CHEMICAL ANALYSIS
0841 SORBENTS, PRODUCT INFORMATION, EQUIPMENT, BOOMS, ABSORPTION, SPILL CONTAINMENT
0847 " PRODUCT INFORMATION, CRUDE OIL, ABSORPTION, SPILL CLEANUP, *BREGOIL
0849 " PRODUCT INFORMATION, ABSORPTION, SPILL REMOVAL, *POLYPROPYLENE ROPE
0857 " SPILL REMOVAL, SPILL CLEANUP, *SCRAP TIRE FIBERS
0865 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, SPILL CLEANUP, *ROPE MOPS
0871 " PRODUCT INFORMATION, SPILL CLEANUP, SURFACTANTS, *SAWDUST
0873 " PRODUCT INFORMATION, PERFORMANCE TESTING, EQUIPMENT, COST ANALYSIS, SPILL REMOVAL
0903 " SKIMMERS, SHIPS, POLLUTION CONTROL, PERSONNEL TRAINING, OIL TRANSPORT, IMCO, EQUIPMENT, CANADA
1177 " SKIMMERS, WASTEWATER TREATMENT, *POLYURETHANE FOAM
0781 SOURCE IDENTIFICATION, REMOTE SENSING, POLLUTION PREVENTION, POLLUTION CONTROL, MONITORING, SURVEILLANCE
0802 " SEAWATER, FRESHWATER, CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES, SPECTROSCOPY
0816 " OIL SPILLS, ANALYTICAL TECHNIQUES, *MULTICOMPONENT FLUORESCENCE
0825 " OIL SPILLS, ANALYTICAL TECHNIQUES, *MULTICOMPONENT FLUORESCENCE
0827 " SHIPS, REFINERIES, ONSHORE, OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION, SWEDEN, TANKERS
0828 " SEA SURFACE, SAMPLING, OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, TAR, TANKERS, SPAIN
0829 " SANTA BARBARA CHANNEL, NATURAL SEEPAGE, INTERTIDAL ZONE, COASTS, CALIFORNIA, BEACHES, TAR, *ASPHALT DEPOSITS
0830 " POLLUTION CONTROL, PETROLEUM PRODUCTS, INTERNATIONAL CONVENTIONS, CONTAMINATION, USSR
0831 " HYDROCARBONS , EQUIPMENT, CHROMATOGRAPHY, CHEMICAL ANALYSIS
0832 " SEDIMENTS, OIL SLICKS, MONITORING, MARINE ORGANISMS, CHROMATOGRAPHY
0833 " PETROLEUM PRODUCTS, GROUNDWATER, CONTAMINATION, CHEMICAL EFFECTS
0758 SOURCES, NATURAL SEEPAGE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, *SANTA MONICA BAY, *GEOPHYSICS
0782 " SANTA BARBARA CHANNEL, REMOTE SENSING, NATURAL SEEPAGE, MONITORING, DETECTION, CALIFORNIA, TAR, *GEOLOGY, *OCEANOGRAPHY
0805 " SEDIMENTS, OCS, MASSACHUSETTS, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS, ATLANTIC COAST
0826 " SANTA BARBARA CHANNEL, SAMPLING, PRODUCTION, OFFSHORE, NATURAL SEEPAGE, EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES, TAR
0990 " RED SEA, POLLUTION CONTROL, ECOSYSTEMS
1017 " SEDIMENTS, ESTUARIES, ENVIRONMENTAL EFFECTS, DISTRIBUTION, CONTAMINATION, COASTAL WATERS, BIODEGRADATION
1047 " SEA SURFACE, SANTA BARBARA CHANNEL, PHYSICAL ASPECTS, NATURAL SEEPAGE, MOVEMENT, FATE, CALIFORNIA, BEHAVIOR, *OCEANOGRAPHY
1093 " SANTA BARBARA CHANNEL, NATURAL SEEPAGE, HYDROCARBONS , FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA, TAR
1094 " SANTA BARBARA CHANNEL, OFFSHORE, NATURAL SEEPAGE, FATE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS, TAR
1095 " SANTA BARBARA CHANNEL, OCS, NATURAL SEEPAGE, FATE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, TAR, *GEOLOGY
1096 " MEDITERRANEAN SEA, CONTAMINATION, COASTAL WATERS, BALLAST
1097 " POLLUTION CONTROL, OIL TRANSFER, MOVEMENT, MARINE ENVIRONMENT
1118 " PRODUCTION, OCS, NATURAL SEEPAGE, HYDROCARBONS , EXPLORATION, CHEMICAL EFFECTS, CALIFORNIA
0828 SPAIN, SOURCE IDENTIFICATION, SEA SURFACE, SAMPLING, OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, TAR, TANKERS
0774 SPECTROMETRY, PETROLEUM PRODUCTS, DETECTION, CHROMATOGRAPHY, ANALYTICAL TECHNIQUES
0800 SPECTROSCOPY, SEAWATER, SAMPLING, PACIFIC OCEAN, CRUDE OIL, CONCENTRATIONS, CHEMICAL ANALYSIS, CANADA
0802 " SOURCE IDENTIFICATION, SEAWATER, FRESHWATER, CHEMICAL ANALYSIS, ANALYTICAL TECHNIQUES
0751 SPILL CLEANUP, PRODUCT INFORMATION, MONITORING, EQUIPMENT, BALLAST , SPILL REMOVAL
0844 " SHIPS, OIL-WATER SEPARATION, OIL REMOVAL, EQUIPMENT

0845 SPILL CLEANUP, SKIMMERS, PRODUCT INFORMATION, PERFORMANCE TESTING, EQUIPMENT, *ELENI V SPILL
0846 " SHORELINES, MANUALS, GUIDELINES, EPA, SPILL RESPONSE
0847 " SORBENTS, PRODUCT INFORMATION, CRUDE OIL, ABSORPTION, *EREGOIL
0848 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0851 " DISPERSANTS, COASTAL WATERS, BEACHES, UK
0853 " DISPERSANTS, CANADA, BIBLIOGRAPHIES
0854 " EQUIPMENT, *GEOPHYSICAL METHODS
0856 " SKIMMERS, PRODUCT INFORMATION, PERFORMANCE TESTING, *BRAVO BLOWOUT
0857 " SORBENTS, SPILL REMOVAL, *SCRAP TIRE FIBERS
0858 " PRODUCT INFORMATION, DISPERSANTS, BIOLOGICAL EFFECTS
0859 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0860 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0861 " ICE, CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE
0862 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0863 " SKIMMERS, PRODUCT INFORMATION, EQUIPMENT
0864 " SHIPS, POLLUTION CONTROL, EMULSIONS, DISPOSAL , DESIGN-ENGINEERING, WASTEWATER TREATMENT
0865 " SORBENTS, SKIMMERS, PRODUCT INFORMATION, EQUIPMENT, *ROPE MOPS
0868 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, SPILL DISPOSAL, *DEBRIS DISPOSAL
0869 " SKIMMERS, PRODUCT INFORMATION, PERFORMANCE TESTING, OIL-WATER SEPARATION, EQUIPMENT, DESIGN-ENGINEERING, BOOMS
0870 " EQUIPMENT, DISPERSANTS, *AERIAL APPLICATION
0871 " SORBENTS, PRODUCT INFORMATION, SURFACTANTS, *SAWDUST
0872 " RIVERS, ICE, COLD CLIMATES, CANADA, SPILL CONTAINMENT
0874 " RIVERS, ONSHORE, LAKES , FRESHWATER, CANADA, SPILL RESPONSE
0880 " IXTOC 1 BLOWOUT, GULF OF MEXICO, EQUIPMENT, SPILL RESPONSE, USN, TEXAS, *BURMAH AGATE SPILL
0883 " MONITORING, INCINERATION, ICE, CANADA, ARCTIC, SPILL RESPONSE, SPILL CONTAINMENT, *AMOP PROGRAM
0887 " SHORELINES, PERSONNEL TRAINING, MANUALS, GUIDELINES, EQUIPMENT, BEACHES
0895 " SHORELINES, RESTORATION, MANUALS, GUIDELINES, EPA, CONTINGENCY PLANNING, SPILL RESPONSE
0904 " ENVIRONMENTAL EFFECTS, COASTS, COASTAL WATERS, CANADA
0905 " COASTS, COASTAL WATERS, CANADA, SPILL RESPONSE
0906 " PERSONNEL TRAINING, INFORMATION SYSTEMS, FRANCE, EQUIPMENT, CONTINGENCY PLANNING, SPILL RESPONSE
0910 " MOVEMENT, FATE, DRIFT, BIODEGRADATION, SPILL RESPONSE, WEATHERING
0996 " OIL SPILLS, MARINE ENVIRONMENT, FATE, EQUIPMENT, ENVIRONMENTAL EFFECTS
1008 " ICE, CANADA, BEHAVIOR, ARCTIC, *RESEARCH REVIEW
1024 " SHORELINES, SEDIMENTS, MICROORGANISMS, CRUDE OIL, CONNECTICUT, BIODEGRADATION, BEACHES
1039 " SOIL, RESTORATION, RECOVERY, GROUNDWATER, EMULSIFICATION, BIODEGRADATION
1147 " SHIPS, MONITORING, GOVERNMENT AGENCIES, BIRDS, ALASKA , *USFWS
1168 " PRODUCTION, POLLUTION CONTROL, OIL TRANSPORT, OIL STORAGE, SPILL RESPONSE
0834 SPILL CONTAINMENT, PHYSICAL EFFECTS, PERFORMANCE TESTING, EQUIPMENT, DESIGN-ENGINEERING, BOOMS, BEHAVIOR
0835 " PRODUCT INFORMATION, DESIGN-ENGINEERING, BOOMS
0837 " PRODUCT INFORMATION, EQUIPMENT, BOOMS, *COLLECTANT SPRAYING
0838 " PHYSICAL EFFECTS, OIL SLICKS, BOOMS
0839 " PRODUCT INFORMATION, EQUIPMENT, BOOMS
0840 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, BOOMS
0841 " SORBENTS, PRODUCT INFORMATION, EQUIPMENT, BOOMS, ABSORPTION
0842 " PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, BOOMS
0843 " PRODUCT INFORMATION, EQUIPMENT, BOOMS, UK
0872 " SPILL CLEANUP, RIVERS, ICE, COLD CLIMATES, CANADA
0883 " SPILL CLEANUP, MONITORING, INCINERATION, ICE, CANADA, ARCTIC, SPILL RESPONSE, *AMOP PROGRAM
0890 " MONITORING, ICE, EQUIPMENT, CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE, SPILL REMOVAL
0911 " POLLUTION PREVENTION, POLLUTION CONTROL
0885 SPILL COOPERATIVES, PORTS , POLLUTION CONTROL, NEW YORK, HARBORS, CONTINGENCY PLANNING, SPILL RESPONSE
0868 SPILL DISPOSAL, SPILL CLEANUP, PRODUCT INFORMATION, EQUIPMENT, DESIGN-ENGINEERING, *DEBRIS DISPOSAL
1170 " REUSE, OIL TRANSPORT, FILTRATION, AMOCO CADIZ SPILL, WASTE OIL, SPILL REMOVAL
0751 SPILL REMOVAL, SPILL CLEANUP, PRODUCT INFORMATION, MONITORING, EQUIPMENT, BALLAST
0849 " SORBENTS, PRODUCT INFORMATION, ABSORPTION, *POLYPROPYLENE ROPE
0852 " ENVIRONMENTAL EFFECTS, CRUDE OIL, BURNING, ARCTIC
0857 " SPILL CLEANUP, SORBENTS, *SCRAP TIRE FIBERS
0873 " SORBENTS, PRODUCT INFORMATION, PERFORMANCE TESTING, EQUIPMENT, COST ANALYSIS
0890 " SPILL CONTAINMENT, MONITORING, ICE, EQUIPMENT, CANADA, BEAUFORT SEA, ARCTIC, SPILL RESPONSE
1161 " PIPELINES, OIL INDUSTRY, EUROPE, CONTAMINATION, STATISTICS

1170 SPILL REMOVAL, SPILL DISPOSAL, REUSE, OIL TRANSPORT, FILTRATION, AMOCO CADIZ SPILL, WASTE OIL
0752 SPILL RESPONSE, PRODUCT INFORMATION, OIL SLICKS, MONITORING, EQUIPMENT, DETECTION, *OIL THICKNESS SENSOR
0846 " SPILL CLEANUP, SHORELINES, MANUALS, GUIDELINES, EPA
0855 " DISPERSION, DISPERSANTS, CRUDE OIL
0861 " SPILL CLEANUP, ICE, CANADA, BEAUFORT SEA, ARCTIC
0874 " SPILL CLEANUP, RIVERS, ONSHORE, LAKES , FRESHWATER, CANADA
0877 " PERSONNEL TRAINING, GOVERNMENT AGENCIES, CONTINGENCY PLANNING, COASTS, CANADA, US, *WORKSHOP
0878 " POLLUTION CONTROL, PERSONNEL TRAINING, EQUIPMENT, UK
0880 " SPILL CLEANUP, IXTOC 1 BLOWOUT, GULF OF MEXICO, EQUIPMENT, USN, TEXAS, *BURMAH AGATE SPILL
0881 " POLLUTION PREVENTION, NORWAY, CONTINGENCY PLANNING
0882 " EQUIPMENT, ENGLISH CHANNEL, DISPERSANTS, CONTINGENCY PLANNING, UK
0883 " SPILL CONTAINMENT, SPILL CLEANUP, MONITORING, INCINERATION, ICE, CANADA, ARCTIC, *AMOP PROGRAM
0884 " CONTINGENCY PLANNING, BEAUFORT SEA, ALASKA
0885 " SPILL COOPERATIVES, PORTS , POLLUTION CONTROL, NEW YORK, HARBORS, CONTINGENCY PLANNING
0886 " MANUALS, GUIDELINES, EPA, COLD CLIMATES
0888 " POLLUTION CONTROL, BETULA SPILL, CONTINGENCY PLANNING, *JACOB MAERSK SPILL
0889 " PERSONNEL TRAINING, ICE, FATE, CONTINGENCY PLANNING, COLD CLIMATES, CANADA, BEHAVIOR, BEAUFORT SEA, ARCTIC, ALASKA , US, *WORKSHOP
0890 " SPILL REMOVAL, SPILL CONTAINMENT, MONITORING, ICE, EQUIPMENT, CANADA, BEAUFORT SEA, ARCTIC
0891 " PERFORMANCE TESTING, ICE, COLD CLIMATES, BURNING
0893 " GOVERNMENT AGENCIES, CONTINGENCY PLANNING, CALIFORNIA
0894 " CONTINGENCY PLANNING, UN, *OIL COMBATING CENTRES
0895 " SPILL CLEANUP, SHORELINES, RESTORATION, MANUALS, GUIDELINES, EPA, CONTINGENCY PLANNING
0901 " POLLUTION CONTROL, INTERNATIONAL AGREEMENTS, EUROPE, BIRDS, UK
0902 " POLLUTION PREVENTION, POLLUTION CONTROL, MONITORING, COASTS, *ARABIAN GULF
0905 " SPILL CLEANUP, COASTS, COASTAL WATERS, CANADA
0906 " SPILL CLEANUP, PERSONNEL TRAINING, INFORMATION SYSTEMS, FRANCE, EQUIPMENT, CONTINGENCY PLANNING
0908 " POLLUTION CONTROL, OIL SPILLS, CANADA, ARCTIC, STATISTICS
0910 " SPILL CLEANUP, MOVEMENT, FATE, DRIFT, BIODEGRADATION, WEATHERING
0914 " POLLUTION PREVENTION, POLLUTION CONTROL
0956 " SHIPS, SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, USN, USCG
0971 " SOCIOECONOMIC EFFECTS, RISK ANALYSIS, PORTS , PACIFIC COAST, EIS, ECONOMICS, CANADA, WASHINGTON
0988 " IMCO, DISPERSANTS, TORREY CANYON SPILL
0995 " OIL INDUSTRY, BOOK REVIEW, BIRDS, *BIRD PROTECTION
1000 " ICE, COLD CLIMATES, BUZZARDS BAY, BOUCHARD 65 SPILL, BEHAVIOR, BAYS
1007 " OFFSHORE, IRELAND, ENVIRONMENTAL EFFECTS
1062 " SIMULATIONS, PERSONNEL TRAINING, INFORMATION SYSTEMS, EQUIPMENT, CONTINGENCY PLANNING
1078 " PREDICTIONS, MODELS, SPILL TRAJECTORIES, *OPERATIONAL FORECAST MODEL
1091 " PREDICTIONS, MODELS, MANUALS, INFORMATION SYSTEMS, GUIDELINES, SPILL TRAJECTORIES, *CLIMATOLOGICAL ATLAS
1133 " IXTOC 1 BLOWOUT, EPA, ENVIRONMENTAL EFFECTS
1165 " PORTS , PERSONNEL TRAINING, OIL TRANSFER, HARBORS, CONTINGENCY PLANNING, TANKERS, UK
1168 " SPILL CLEANUP, PRODUCTION, POLLUTION CONTROL, OIL TRANSPORT, OIL STORAGE
0952 SPILL TRAJECTORIES, SEA SURFACE, MOVEMENT, ICE, DRIFT, COASTS, ARCTIC, ALASKA , *CURRENTS, *METEOROLOGY
0972 " SEA SURFACE, PREDICTIONS, OCS, MONITORING, FATE, DRIFT, BERING SEA, BASELINE STUDIES
0980 " MOVEMENT, ICE, DRIFT, BEAUFORT SEA, BASELINE STUDIES, *CHUKCHI SEA
1046 " PREDICTIONS, PHYSICAL ASPECTS, OIL SLICKS, MODELS, ICE, COLD CLIMATES, BEHAVIOR, ARCTIC, *WORKSHOP PROCEEDINGS
1061 " MODELS, IXTOC 1 BLOWOUT, GULF OF MEXICO, FATE, COASTS, BEACHES
1065 " SIMULATIONS, OIL SLICKS, MOVEMENT, ESTUARIES, ST. LAWRENCE RIVER
1067 " SEA SURFACE, PREDICTIONS, *NEAR-SURFACE CURRENTS
1070 " MODELS, GULF OF ALASKA, COASTS, COASTAL WATERS, STATISTICAL ANALYSIS
1071 " OIL SLICKS, MOVEMENT, INDIA, DRIFT, COASTS
1078 " SPILL RESPONSE, PREDICTIONS, MODELS, *OPERATIONAL FORECAST MODEL
1085 " PREDICTIONS, MOVEMENT, ICE, BEHAVIOR, BEAUFORT SEA, *CHUKCHI SEA
1086 " SIMULATIONS, PREDICTIONS, NOAA, MODELS, ENVIRONMENTAL EFFECTS, COASTS, BEHAVIOR
1091 " SPILL RESPONSE, PREDICTIONS, MODELS, MANUALS, INFORMATION SYSTEMS, GUIDELINES, *CLIMATOLOGICAL ATLAS
1143 " RISK ANALYSIS, OIL TRANSPORT, OIL-GAS LEASING, OFFSHORE, MODELS, EXPLORATION, CALIFORNIA
1044 SPREADING, SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, BEHAVIOR

1049 SPREADING, ICE, FATE, BEHAVIOR, ARCTIC
1051 " PHYSICAL ASPECTS, OIL SLICKS, FATE, BEHAVIOR
1059 " SIMULATIONS, OIL SLICKS, OIL INDUSTRY, MOVEMENT, MODELS, EVAPORATION, BEHAVIOR
1060 " SIMULATIONS, OIL SLICKS, NORTH SEA, MOVEMENT, BLOWOUTS, *SLIKTRACK
1076 " SEA SURFACE, OIL SLICKS, MOVEMENT, MODELS, BEHAVIOR, *HYDRODYNAMIC EQUATIONS
1088 " SIMULATIONS, SEA SURFACE, OIL SLICKS, MOVEMENT, MODELS, ARGO MERCHANT SPILL, *SURFACE CURRENTS
1065 ST. LAWRENCE RIVER, SPILL TRAJECTORIES, SIMULATIONS, OIL SLICKS, MOVEMENT, ESTUARIES
1070 STATISTICAL ANALYSIS, SPILL TRAJECTORIES, MODELS, GULF OF ALASKA, COASTS, COASTAL WATERS
1114 " REFINERIES, OIL INDUSTRY, MORTALITY, HEALTH HAZARDS, *REFINERY WORKERS
0759 STATISTICS, OCS, NATURAL SEEPAGE, COASTAL WATERS, CALIFORNIA, TAR, *SEISMICITY
0908 " SPILL RESPONSE, POLLUTION CONTROL, OIL SPILLS, CANADA, ARCTIC
0975 " OIL TRANSPORT, OCS, INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA
0976 " OIL TRANSPORT, OCS, INFORMATION SYSTEMS, ENVIRONMENTAL EFFECTS, DEVELOPMENT, BASELINE STUDIES, ALASKA
1144 " PLATFORMS, OFFSHORE, OCS, DRILLING, DEVELOPMENT, BLOWOUTS, USGS
1159 " OIL TRANSPORT, AFRICA, TANKERS, *CAPE OF GOOD HOPE, *1968-1980 TANKER SPILLS
1161 " SPILL REMOVAL, PIPELINES, OIL INDUSTRY, EUROPE, CONTAMINATION
1163 " SOIL, PIPELINES, OIL TRANSPORT, OIL SPILLS, GROUNDWATER, EUROPE, CRUDE OIL, CONTAMINATION, TRANS-ALASKA PIPELINE
0913 STORAGE, REFINING, PRODUCTION, POLLUTION PREVENTION, OIL TRANSPORT, MANUALS, LEGISLATION, EXPLORATION, EQUIPMENT
1168 " SPILL RESPONSE, SPILL CLEANUP, PRODUCTION, POLLUTION CONTROL, OIL TRANSPORT
1015 SUBARCTIC REGIONS, NOAA, ENVIRONMENTAL EFFECTS, BIBLIOGRAPHIES, ARCTIC
0769 SUBLETHAL EFFECTS, MONITORING, MEDITERRANEAN SEA, MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, BEACHES, TOXICITY, UNEP, *MALTA
0924 " REPRODUCTION, MORTALITY, MOLLUSKS, CHRONIC EFFECTS, BIOLOGICAL EFFECTS
0938 " MORTALITY, FUEL OIL, CHRONIC EFFECTS, WSF
0940 " FISH, ECOSYSTEMS, DETECTION, CONTAMINATION, TOXICITY, WASTEWATERS
0945 " ESTUARIES, CONTAMINATION, TOXICITY, *COPEPODS, *NAPHTHALENE
1005 " MARINE ORGANISMS, MARINE ENVIRONMENT, HEALTH HAZARDS, ENVIRONMENTAL EFFECTS, CARCINOGENS, UN
1013 " MORTALITY, MEDITERRANEAN SEA, FISHERIES, CONTAMINATION, UN, *FAO
1101 " METABOLISM, FISH, CRUDE OIL, CHRONIC EFFECTS, WSF, *MORPHOLOGICAL CHANGES
1102 " PACIFIC OCEAN, OCS, FISH, DEVELOPMENT, BEHAVIOR
1106 " METABOLISM, FISH, BEHAVIOR, UPTAKE, *BIOTRANSFORMATION, *TRACE METAL EFFECTS
1110 " MORTALITY, GULF OF ALASKA, CRUDE OIL, BIRDS, *HERRING GULLS
1112 " MARINE ORGANISMS, DEPURATION, CHRONIC EFFECTS, ALASKA , ACUTE EFFECTS, TOXICITY, UPTAKE, *OCSEAP PROGRAM
0871 SURFACTANTS, SPILL CLEANUP, SORBENTS, PRODUCT INFORMATION, *SAWDUST
0951 " PETROLEUM PRODUCTS, MOLLUSKS, MARINE ORGANISMS, BENTHOS
1030 " MICROORGANISMS, HYDROCARBONS , GROWTH, BIODEGRADATION
1179 " FLOTATION, EMULSIONS, WASTEWATER TREATMENT, *AERATION
0755 SURVEILLANCE, OIL SPILLS, MONITORING, DETECTION
0761 " REMOTE SENSING, MONITORING, DETECTION, BIBLIOGRAPHIES
0776 " REMOTE SENSING, PRODUCT INFORMATION, NORWAY, NORTH SEA, EQUIPMENT, DESIGN-ENGINEERING, COASTS
0778 " REMOTE SENSING, POLLUTION CONTROL, MONITORING, MEDITERRANEAN SEA, COASTS, COASTAL WATERS, TANKERS, *TURKEY
0781 " SOURCE IDENTIFICATION, REMOTE SENSING, POLLUTION PREVENTION, POLLUTION CONTROL, MONITORING
0783 " REMOTE SENSING, MONITORING, GULF OF MEXICO, IXTOC 1 SPILL, *LANDSAT
1152 " REGULATIONS, PORTS , OIL SLICKS, TANKERS
0827 SWEDEN, SOURCE IDENTIFICATION, SHIPS, REFINERIES, ONSHORE, OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION, TANKERS
1195 " FINLAND, ENVIRONMENTAL EFFECTS, CONTAMINATION, BIBLIOGRAPHIES
0767 TANKERS, SHIPS, PERFORMANCE TESTING, MONITORING, EQUIPMENT, WASTEWATERS, UK
0775 " SHIPS, REMOTE SENSING, OIL SLICKS, OIL DISCHARGES, HYDROCARBONS ,NATURAL SEEPAGE
0778 " SURVEILLANCE, REMOTE SENSING, POLLUTION CONTROL, MONITORING, MEDITERRANEAN SEA, COASTS, COASTAL WATERS, *TURKEY
0808 " SAMPLING, INDIAN OCEAN, HYDROCARBONS , DETECTION, CONCENTRATIONS, COASTS
0822 " SEDIMENTS, SAMPLING, PORTS , PIPELINES, HYDROCARBONS , HARBORS, CONCENTRATIONS, COASTAL WATERS, ALASKA
0827 " SWEDEN, SOURCE IDENTIFICATION, SHIPS, REFINERIES, ONSHORE, OIL TRANSFER, OIL SPILLS, OFFSHORE, NATURAL SEEPAGE, DRILLING, CONTAMINATION
0828 " SPAIN, SOURCE IDENTIFICATION, SEA SURFACE, SAMPLING, OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY, TAR
1081 " SIMULATIONS, SHIPS, POLLUTION PREVENTION, OIL TRANSFER
1121 " REGULATIONS, REFINERIES, OIL INDUSTRY, GUIDELINES
1148 " POLLUTION CONTROL, CRUDE OIL WASHING
1149 " OIL SPILLS, GULF OF MEXICO, *ISTANBUL
1151 " PRODUCT INFORMATION, EQUIPMENT, DETECTION, *ESTIMATES OF OIL, *SUNKEN TANKERS
1152 " SURVEILLANCE, REGULATIONS, PORTS , OIL SLICKS

1153 TANKERS, PERSONNEL TRAINING, OIL TANKS, CRUDE OIL WASHING
1155 " REGULATIONS, POLLUTION CONTROL, OIL DISCHARGES, IMCO, BALLAST
1156 " SAFETY, REGULATIONS, POLLUTION PREVENTION
1157 " SEGREGATED BALLAST, REGULATIONS, ECONOMIC EFFECTS, DESIGN-ENGINEERING
1158 " SHIPS, SAFETY, REGULATIONS, OIL TRANSPORT, LIABILITY, INTERNATIONAL CONVENTIONS, IMCO, COMPENSATION
1159 " STATISTICS, OIL TRANSPORT, AFRICA, *CAPE OF GOOD HOPE, *1969-1980 TANKER SPILLS
1165 " SPILL RESPONSE, PORTS , PERSONNEL TRAINING, OIL TRANSFER, HARBORS, CONTINGENCY PLANNING, UK
1166 " PRODUCT INFORMATION, OIL TRANSFER, OIL SPILLS, MONITORING, EQUIPMENT, DETECTION
1167 " SHIPS, REGULATIONS, OIL DISCHARGES, LEGISLATION
1169 " SHIPS, POLLUTION CONTROL, OIL TRANSPORT, IMCO, BALLAST
1174 " BALLAST , WASTEWATER TREATMENT
0758 TAR, SOURCES, NATURAL SEEPAGE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, *SANTA MONICA BAY, *GEOPHYSICS
0759 " STATISTICS, OCS, NATURAL SEEPAGE, COASTAL WATERS, CALIFORNIA, *SEISMICITY
0773 " MONITORING, MEDITERRANEAN SEA, HYDROCARBONS , DISTRIBUTION, CONCENTRATIONS
0782 " SOURCES, SANTA BARBARA CHANNEL, REMOTE SENSING, NATURAL SEEPAGE, MONITORING, DETECTION, CALIFORNIA, *GEOLOGY, *OCEANOGRAPHY
0803 " SAMPLING, MEDITERRANEAN SEA, DRILLING, DISTRIBUTION, COASTAL WATERS, BEACHES, ZOOPLANKTON, *NEUSTON
0810 " NATURAL SEEPAGE, CRUDE OIL, COASTAL WATERS, CHEMICAL ANALYSIS, CALIFORNIA, BEACHES, ANALYTICAL TECHNIQUES
0811 " SEAWATER, SAMPLING, DETECTION, CONCENTRATIONS, BERMUDA
0817 " OXIDATION, FATE, COASTAL WATERS, BLACK SEA, WEATHERING, USSR
0821 " SEA SURFACE, SAMPLING, MEDITERRANEAN SEA, CONTAMINATION, CONCENTRATIONS
0826 " SOURCES, SANTA BARBARA CHANNEL, SAMPLING, PRODUCTION, OFFSHORE, NATURAL SEEPAGE, EXPLORATION, DISTRIBUTION, CALIFORNIA, BEACHES
0825 " TANKERS, SPAIN, SOURCE IDENTIFICATION, SEA SURFACE, SAMPLING, OIL DISCHARGES, MEDITERRANEAN SEA, ITALY, COASTS, CHROMATOGRAPHY
0829 " SOURCE IDENTIFICATION, SANTA BARBARA CHANNEL, NATURAL SEEPAGE, INTERTIDAL ZONE, COASTS, CALIFORNIA, BEACHES, *ASPHALT DEPOSITS
0954 " SEDIMENTS, PHYSICAL ASPECTS, HYDROCARBONS , ADSORPTION, *AUTOPURIFICATION
0959 " SEDIMENTS, SEA SURFACE, PHYSICAL ASPECTS, OIL SLICKS, MEDITERRANEAN SEA, DISTRIBUTION, CONTAMINATION, ADSORPTION
1090 " DISTRIBUTION, CRUDE OIL, BIOLOGICAL EFFECTS, ATLANTIC OCEAN, WEATHERING, *NEUSTONIC PERIPHYTON
1093 " SOURCES, SANTA BARBARA CHANNEL, NATURAL SEEPAGE, HYDROCARBONS , FATE, DISTRIBUTION, CHEMICAL ANALYSIS, CALIFORNIA
1094 " SOURCES, SANTA BARBARA CHANNEL, OFFSHORE, NATURAL SEEPAGE, FATE, DISTRIBUTION, CRUDE OIL, CHEMICAL ANALYSIS, CALIFORNIA, BIOLOGICAL EFFECTS
1095 " SOURCES, SANTA BARBARA CHANNEL, OCS, NATURAL SEEPAGE, FATE, DISTRIBUTION, COASTAL WATERS, CALIFORNIA, *GEOLOGY
0814 TEXAS, SEDIMENTS, SAMPLING, PLATFORMS, OCS, HYDROCARBONS , DRILLING, DISTRIBUTION, CONCENTRATIONS
0880 " SPILL RESPONSE, SPILL CLEANUP, IXTOC 1 BLOWOUT, GULF OF MEXICO, EQUIPMENT, USN, *BURMAH AGATE SPILL
0988 TORREY CANYON SPILL, SPILL RESPONSE, IMCO, DISPERSANTS
0769 TOXICITY, SUBLETHAL EFFECTS, MONITORING, MEDITERRANEAN SEA, MARINE ORGANISMS, CONTAMINATION, COASTAL WATERS, BEACHES, UNEP, *MALTA
0915 " FISH, CONTAMINATION, ARGO MERCHANT SPILL, *COD EGGS
0918 " PAH, METABOLISM, INVERTEBRATES, *LITTLE SKATE
0919 " PETROLEUM PRODUCTS, MORTALITY, FUEL OIL, CONCENTRATIONS, ALGAE, *SYNECHOCYSTIS AQUATILIS
0920 " SEAWATER, PERFORMANCE TESTING, DISPERSANTS, BEACHES, UK
0926 " INVERTEBRATES, COASTAL WATERS, BARENTS SEA, ALGAE
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APPENDIX A
Periodicals Reviewed

Abstracts on Health Effects of Environmental Pollutants
Alternatives: Perspectives on Society and Environment
Ambio
American Fisheries Society Transactions
Analytical Chemistry
Applied Ecology Abstracts
Applied Energy
Applied Microbiology
Applied Science & Technology Index
Aquatic Sciences & Fisheries Abstracts
Audubon
Australian Science Index
Berichte der Deutschen Wissenschaftlichen Komission fuer Meeresforschung
Bibliography and Index of Geology
Biological Abstracts
Bioresearch Index
Bioscience
British Birds
British Library. Lending Division. Index of Conference Proceedings Received
Bulletin of Environmental Contamination and Toxicology
Bulletin of Marine Science
Catalyst for Environmental Quality
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemical Engineering Progress
Chemical Week
Chemistry in Canada
Chemosphere
Coastal Engineering
Coastal Zone Management Journal
Conservation News
Current Contents: Life Sciences
Current Contents: Physical and Chemical Sciences
Deep-Sea Research/Oceanographic Bibliography
Ecological Abstracts
Ecological Modelling
The Ecologist
Ecology Law Quarterly
Effluent & Water Treatment Journal
Energy Information Abstracts
Energy Review
The Engineering Index Monthly
Environment

Environment Abstracts
Environment Reporter
Environmental Action
Environmental Conservation
Environmental Geology
Environmental Health and Pollution Control
Environmental Management
Environmental Periodicals Bibliography
Environmental Pollution
Environmental Research
Environmental Science & Technology
Environmental Technology and Economics
EPA Environmental News
EPA Reports Bibliography Quarterly
ERDA Energy Research Abstracts
Estuarine and Coastal Marine Science
Fuel Abstracts and Current Titles
Geochimica et Cosmochimica Acta
Government Reports Announcements
Groundwater
Hydrocarbon Processing
India Journal of Environmental Health
Industrial Wastes Information Bulletin
INTERDOK Directory of Published Proceedings
International Aerospace Abstracts
International Journal of Ecology and Environmental Science
International Journal of Environmental Analytical Chemistry
International Journal of Environmental Studies
International Petroleum Abstracts
Iranian Journal of Science and Technology
The Journal of Applied Ecology
Journal of Canadian Petroleum Technology
Journal of Chromatography
Journal of Environmental Science and Health, Part A
Journal of Environmental Sciences
Journal of the Institute of Water Pollution Control
Journal of Petroleum Technology
Journal of the Fisheries Research Board of Canada
Journal of Toxicology and Environmental Health
Limnology and Oceanography
Marine Biological Association of the United Kingdom, Journal
Marine Biology
Marine Chemistry
Marine Geology
Marine Geotechnology
Marine Policy
Marine Pollution Bulletin
Marine Pollution Research Titles
Marine Science Contents Tables
Marine Technology
Marine Technology Society, Journal
Maritime Research Information Service Abstracts
Microbial Ecology
National Fisherman
National Research Council, News Report

National Wildlife
Nature
New Technical Books
Nippon Susan Gakkai Shi. Bulletin of the Japanese Society of Scientific Fisheries
Northwest and Alaska Fisheries Center Monthly Reports
Ocean Engineering
Ocean Industry
Ocean Management
Oceanic Abstracts
Oceanographic Abstracts and Bibliography
Oceanus
Offshore
Oil and Gas Journal
Oil Spill Intelligence Report
Outdoor California
Pacific Oil World
Petroleum Abstracts
Petroleum Engineer International
Petroleum Today
Pollution Abstracts
Pollution Engineering
Proceedings in Print
Progress in Water Technology
Rapports et Proces Verbaux
Resources
Resource Recovery and Conservation
Royal Society of London, Proceedings, Series B, Biological Sciences
Science
The Sciences
Science News
Science of the Total Environment
Scientific and Technical Aerospace Reports
Scientific Meetings
Sea Frontiers
Sea Secrets
Sea Technology
Selected Water Resources Abstracts
Shore and Beach
Spill Technology Newsletter
Summaries of Foreign Government Environmental Reports
Tanker Advisory Center Newsletter
Technical Book Review Index
Technology Review
Toxicity Bibliography
UDS Water Quality Control Digest
Underwater Information Bulletin
Underwater Naturalist
Waste Materials Biodegradation Research Titles
Water, Air and Soil Pollution
Water & Pollution Control
Water & Wastes Engineering
Water Pollution Control Federation, Journal
Water Research
Western Fisheries

APPENDIX B
OIL POLLUTION ABSTRACTS--AVAILABILITY LISTING

OPA -current title: OIL POLLUTION ABSTRACTS
OPR -former title: OIL POLLUTION REPORTS
OSOPR-former title: OIL SPILL AND OIL POLLUTION REPORTS

TITLE	REPORT PERIOD	EPA ACCESSION NUMBER	NTIS ORDER NUMBER	PRICE	PAGES
OSOPR	Jul 74-Oct 74	EPA 670/2-75-003	PB 240-719	$ 9.25	206
OSOPR	Nov 74-Feb 75	EPA 670/2-75-044	PB 242-542	10.75	261
OSOPR	Feb 75-Apr 75	EPA 670/2-75-059	PB 243-724	9.50	235
OSOPR	May 75-Jul 75	EPA 600/2-76-129	PB 258-852	12.00	315
OSOPR	Aug 75-Oct 75	EPA 600/2-76-113	PB 258-745	11.75	299
OSOPR	Nov 75-Jan 76	EPA 600/2-76-185	PB 257-886	12.50	353
OSOPR	Feb 76-Apr 76	EPA 600/2-76-215	PB 259-932	11.75	308
OSOPR	May 76-Jul 76	EPA 600/2-76-266	PB 264-870	12.50	345
OSOPR	Aug 76-Oct 76	EPA 600/2-77-037	PB 267-266	11.75	307
OSOPR	Nov 76-Jan 77	EPA 600/2-77-075	PB 268-248	11.75	294
OSOPR	Feb 77-Apr 77	EPA 600/2-77-111	PB 272-689	12.50	326
OSOPR	May 77-Jul 77	EPA 600/2-77-243	PB 276-691	13.00	375
OSOPR	Aug 77-Oct 77	EPA 600/2-78-005	PB 281-114	11.00	280
OSOPR	Vol. 5, No. 1 Nov. 77-Jan 78	EPA 600/2-78-071	PB 281-671	9.25	190
OPR	Vol. 5, No. 2 Feb 78-May 78	EPA 600/7-78-160	PB 287-071	10.75	242
OPR	Vol. 5, No. 3 Jun 78-Sep 78	EPA 600/7-78-218	PB 290-227	11.75	294
OPR	Vol. 5, No. 4 Oct 78-Dec 78	EPA 600/7-79-040	PB 293-315	9.25	189
OPA	Vol. 6, No. 1 Jan 79-Mar 79	EPA 600/7-79-160	PB 80-129-117	13.00	211
OPA	Vol. 6. No. 2 Apr 79-Jun 79	EPA 600/7-79-254	PB 80-141-583	16.00	281
OPA	Vol. 6, No. 3 Jul 79-Sep 79	EPA 600/7-80-007	PB 80-175-475	14.00	247
OPA	Vol. 6, No. 4 Oct 79-Dec 79	EPA 600/7-80-053	PB 80-191-067	13.00	200
OPA	Vol. 7, No. 1 Jan 80-Jun 80	EPA 600/7-8_-___	PB __-___-___	__.__	349
OPA	Vol. 7, No. 2 Jul 80-Nov 80	EPA 600/7-8_-___	PB __-___-___	__.__	220

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